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OF  
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VOL. IV.

1929.

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Wednesday, February 6th, 1929.

Dr. K. JORDAN, President, in the Chair.

*Obituary.*

The PRESIDENT announced the deaths of Dr. J. L. REVERDIN, an Honorary Fellow, and of Mr. O. R. GOODMAN and Major WATKIN TEMPLE, Fellows of the Society.

*Nomination of Vice-Presidents.*

The PRESIDENT announced that he had nominated Mr. J. E. COLLIN, Dr. R. STEWART MACDOUGALL and Mr. N. D. RILEY, as Vice-Presidents for the coming year.

*New Member of Council.*

The SECRETARY announced that Mr. H. WILLOUGHBY ELLIS had been co-opted on to the Council to fill the vacancy caused by Captain A. F. HEMMING having become Treasurer.

*Proposed Changes in the Bye-Laws.*

The SECRETARY read the proposed changes in the Bye-Laws of the Society, to be considered at a special meeting in April.

*Exhibits.*

*CARCHARODUS DRAVIRA*, MOORE, A GOOD SPECIES.—Captain A. F. HEMMING exhibited specimens of *Carcharodus dravira*, Moore, from Chitral, and of *C. orientalis*, Rev., from Palestine, Transjordan and Syria, and communicated the following note:—

“ In 1913 Reverdin gave the name *Carcharodus orientalis* (*Bull. Soc. lép. Gen.*, ii, p. 230, pl. 21, fig. 14 ♂, pl. 22, fig. 1 (fore-wing), fig. 8 (genitalia)) to specimens taken in the Peloponnese and in Asia Minor (Tokat), which he showed were specifically distinct from *Carcharodus altheae*, Hb. (1802). Until then it had been

thought that *altheae* which Hübner described from 'Germany' occurred in Central and Southern Europe, eastwards through Asia Minor, Armenia and Persia to Baluchistan, Chitral and Kashmir. Reverdin's discovery demonstrated :—

- (a) that *C. altheae* is confined to Central and Southern Europe;
- (b) that in Eastern Europe and the Near East it is replaced by *C. orientalis*.

"The latter species is now known to occur also in Syria (Lebanon and Anti-Lebanon), Palestine and Transjordan. The so-called eastern subspecies of *C. altheae* from Kashmir, named *Pyrgus dravira* by Moore (*Proc. Zool. Soc. Lond.*, 1874, p. 576, pl. 67, fig. 5 ♂ ['♀'], 1874) was not dealt with by Reverdin, and its status has remained obscure to this day.

"For the facilities kindly accorded to him in the preparation of the following notes in regard to *dravira*, the writer is much indebted to the Trustees of the British Museum. The evidence of the genitalia shows conclusively that *C. dravira* is a perfectly distinct species, not belonging strictly to any of the three groups (accorded generic value by Warren, *Trans. Ent. Soc. Lond.*, LXXIV, p. 14, 1926) into which the species of *Carcharodus* naturally fall, viz. :—

- (a) *alceae*, Esp. (1783),
- (b) *lavatherae*, Esp. (1783), and *tauricus*, Rev. (1915),
- (c) *altheae*, Hb. (1802), *baeticus*, Ramb. (1839), *stauderi*, Rev. (1913), *ramses*, Rev. (1914), and *orientalis*, Rev. (1913).

"*C. dravira* is nearest to group (b) above, which it resembles in the partially chitinised membranous process by which the tenth sternite is represented; but differs from it in the extraordinary development of the harpe. This structure at once distinguishes *dravira* from any other species of the genus.

"The following is a short description of the genitalia of *C. dravira* (see Pl. I, fig. 1) as compared with those of *C. orientalis* (Pl. I, fig. 2), the species which superficially it most closely resembles :—

#### ***Carcharodus dravira*, Moore.**

"The whole genitalia larger than in *orientalis*; tegumen more massive; uncus not tapering to so sharp a point; 10th sternite represented by a smaller and less heavily chitinised structure; saccus longer, straighter and more massive; clasp subtriangular, the distal portion of the cuiller more or less square (rather resembling that of *altheae* which is, however, relatively much broader), not convex (*i.e.* up-turned) as in *orientalis*; harpe very large and irregularly shaped, the distal portion consisting of a heavily-chitinised, semi-circular armature thickly studded with massive teeth over its whole surface, the proximal portion of the clasp shaped like a shoulder with a deep depression immediately before the distal armature; aedoeagus more massive than in *orientalis*, the eversible membrane (*i.e.* the penis) bearing a large number of chitinised teeth (in *orientalis* there are fewer of these teeth and they are smaller and less heavily chitinised).

"The following short description of *C. dravira* is added, as there is no published description giving the characters by which it can be separated from *C. orientalis*.

"Superficially nearest to *C. orientalis*, Rev., which it resembles in the shape, size and arrangement of the translucent spots of the fore-wing, which are larger and squarer than in *C. altheae*, Hb. *Upperside*. Ground-colour greyish-brown instead of grey (*orientalis*) or blackish brown (*altheae*); submarginal and submedian rows of whitish spots on hind-wing, well developed as in *orientalis* (both rows much less



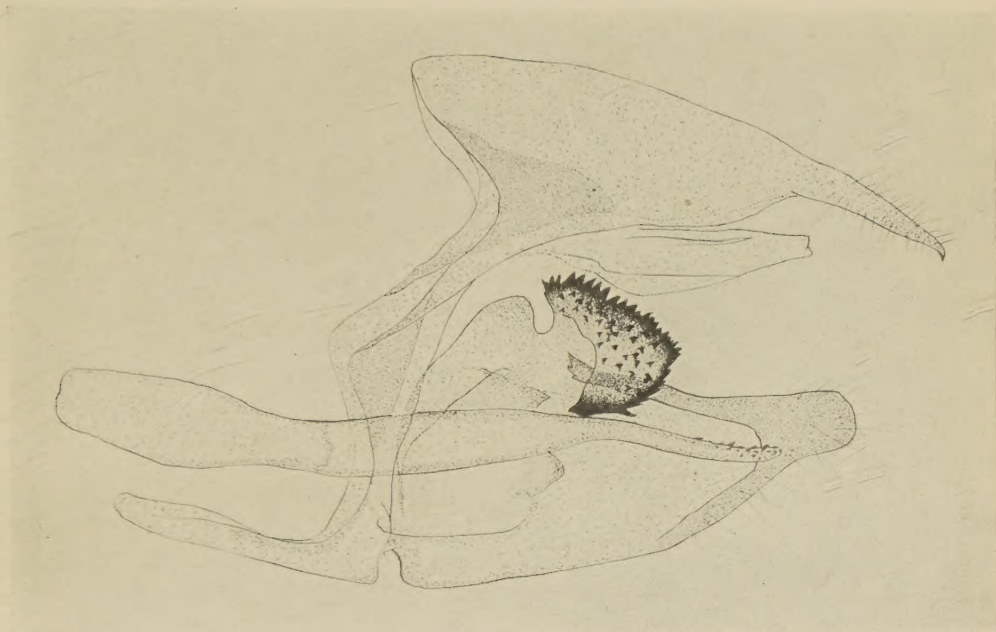


FIG. 1.—*Carcharodus dravira*, Moore. Chitral, Shishi Kuh Valley, 9,000–14,000 ft., July–August 1891.  
G. H. Colomb.

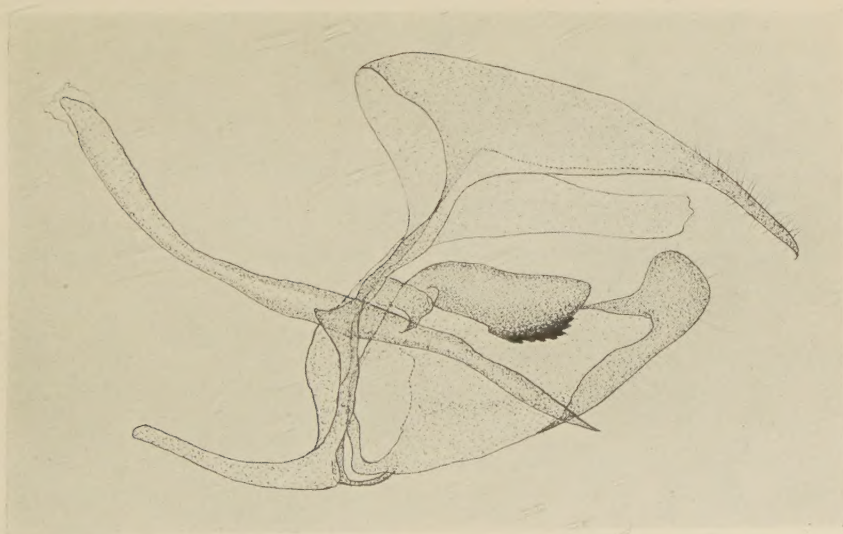


FIG. 2.—*Carcharodus orientalis*, Reverdin. Lebanon, Safsaf, West of Shtora. 14.6.1928.  
L. K. Lockhart.  
V.M.H. del.



marked in *altheae*). *Underside*. Ground-colour of fore-wing black (light grey except at base in *orientalis*, dark greyish-brown in *altheae*); fore-wings with well-developed row of whitish submarginal spots (poorly developed in *orientalis* and *altheae*); ground-colour of hind-wings like *altheae* (darker than in *orientalis*); submarginal and submedian rows of whitish spots well developed as in *orientalis* (poorly developed in *altheae*).

“Length of fore-wing : ♂ 16 mm., ♀ 17 mm. (*dravira*); (*orientalis*, ♂ 14–15 mm., ♀ 16 mm.).

“In his original description Moore gave the locality of *dravira* as ‘Cashmere (Capt. H. B. Hellard),’ and stated that his type was a female. This specimen, which is in the British Museum, is, however, a male.”

TWO NEW SUBSPECIES OF *POLYOMMATUS LOEWII*, ZELL.—Captain A. F. HEMMING exhibited specimens of two new subspecies of *Polyommatus loewii*, Zell., and communicated the following note :—

“The collections made in Transjordan in 1927 by Captain L. K. Lockhart, M.B.E., M.C., R.A., and Lt.-Col. F. W. Bewsher, D.S.O., O.B.E., M.C., contain a long series of an undescribed subspecies of *Polyommatus loewii*, Zell. In 1928 Captain Lockhart was fortunate enough to find another subspecies, also undescribed, of *P. loewii* in the Anti-Lebanon. The following are descriptions of these subspecies.

***Polyommatus loewii lockharti*, ssp. nov.** Differs from *loewii loewii*, Zell., in the following particulars :—

“♂ *upperside*. Ground-colour clear bright sky-blue without the purplish tinge of *loewii loewii*; black marginal border narrower and the veins which have the appearance of being a whiter blue than the ground-colour have no outlining of black scales towards the termen; fringes snow-white.

“♂ *underside*. Ground-colour, pale whitish grey instead of pale grey with a faint brownish tinge; the white rings to the submedian spots very inconspicuous against the pale ground-colour. *Fore-wings*. Black centres of submedian spots more prominent and placed nearer to the termen than in *loewii loewii*, the large spot in Interspace 2 being much more in line with the rest of the spots of this series; the dark inner edging of the submarginal lunules (strongly developed in *loewii loewii*) are small and of a paler brown. *Hind-wings*. Whitish postdiscal inter-neural dashes very inconspicuous owing to pale ground-colour; one pale yellowish-orange submarginal lunule in Interspace 1B, surmounting a very pronounced metallic blue spot; a similar but smaller metallic spot in Interspace 1A.

“♀ *upperside*. Uniform greyish brown with a series both on fore- and hind-wings of well-developed whitish postdiscal inter-neural streaks and of small blackish-brown marginal spots. Fore-wing discoidal spots outlined with whitish scales. On the hind-wings there is an orange submarginal lunule in Interspace 1B.

“♀ *underside*. Ground-colour pale brownish grey (pale brown in *loewii loewii*); markings similar to those of the ♂, the submedian spots (both wings), submarginal lunules on fore-wings and yellowish-orange lunules on hind-wings smaller and less conspicuous than in *loewii loewii* ♀.

“Length of fore-wing : ♂ 15 mm., ♀ 14.5 mm.

“♂ holotype. ‘Transjordan, 1½ miles west of Qasr Azraq, 24.4.1927, L. K. Lockhart’ (A. F. Hemming Coll. No. 19848).

“♀ allotype. ‘Transjordan, 1½ miles west of Qasr Azraq, 27.4.1927, L. K. Lockhart’ (A. F. Hemming Coll. No. 19859).



"With normal females of *lockharti* described above, there occurred also a dimorphic (blue) ♀. In this form (♀-form *margaritae*, nov.) the ground-colour is of the same clear bright sky-blue as in the ♂. On the fore-wings on the upperside there is a fairly wide brown marginal border in which can be seen the darker brown marginal spots; the veins and discoidal spots clearly outlined with dark brown scaling. On the hind-wings the black marginal spots and the single orange spot in Interspace 1B (reduced in size) are as in normal ♀-form of *lockharti*. Six out of thirty-one ♀♀ taken (i.e. 19%) were of the *margaritae* form, which is named after Mrs. L. K. Lockhart. The type of *margaritae* is labelled 'Transjordan, 1½ miles West of Qasr Azraq, 24.4.1927, L. K. Lockhart' (A. F. Hemming Coll. No. 19850).

"The following is a list of the localities in which *lockharti* was taken, together with the dates of capture.

"TRANSJORDAN—Wadi Rajil, N.E. of Jebel Kurma (20 m. E. of Qasr Azraq), 20.4.1927, ♂ 3; 1½ m. west. of Qasr Azraq, 24.4.1927, ♂ 6, ♀ 2 (f. *margaritae*); 2 m. east of Qasr Azraq, 26.4.1927, ♂ 6, ♀ 2; 1½ m. west of Qasr Azraq, 27.4.1927, ♂ 10, ♀ 2; 2 m. north-east of Qasr Azraq, 28.4.1927, ♂ 12, ♀ 2 (one normal, one f. *margaritae*), and (same day) 1 m. south-west of Qasr Azraq, ♂ 2, ♀ 1 (f. *margaritae*); 1 m. west of Qasr Azraq, 29.4.1927, ♂ 11, ♀ 7 (including one f. *margaritae*); 30.4.1927, ♂ 1, ♀ 2 (including one f. *margaritae*); 3.5.1927, ♂ 8, ♀ 1; 6.5.1927, ♂ 7, ♀ 4; 3 m. east of Qasr Amruh (15 m. W. of Qasr Azraq), 7.5.1927, ♂ 13, ♀ 8.

"Paratypes of *lockharti* in Hemming and Bewsher Colls. In the British Museum there are a ♂ and ♀ taken by Captain Lockhart (B.M. Types No. Rh. 351 ♂, 352 ♀) and ♂ 10, ♀ 8 taken by Col. Bewsher.

"The much smaller size of both sexes, the paler ground-colour of the ♂ and the presence in the ♀ of the white inter-neural streaks on the upperside at once distinguish *lockharti* from *gigas*, Stgr. (1871). The nearest ally to *lockharti* is *johannae*, Andres (1917 and 1923), from Egypt, in which the ♂ is an even paler sky-blue, the ♀ almost invariably blue (even the very rare brown ♀♀ being sprinkled with blue scales) resembling a paler version of *margaritae*, and the underside of both sexes still whiter than in *lockharti*.

"As will be seen from the list of localities given above, *lockharti* was only twice taken outside the immediate neighbourhood of Qasr Azraq. Captain Lockhart states that it was abundant where found, but that it was extremely local, being confined to small patches where there was vegetation.

"Graves (*Trans. Ent. Soc. Lond.*, 1925, p. 58, Aug. 1925) has collected the available records of the capture of *P. loewii* in Palestine. The specimens from that country in his collection and in the British Museum though rather larger than those from Transjordan are smaller than *gigas*, and the ♀♀ show the characteristic white inter-neural dashes of *lockharti* which are never present in *gigas*. These Palestinian *loewii* and those from the Lebanon (but not the Anti-Lebanon) are referable to *lockharti*.

#### ***Polyommatus loewii antilibanotica*, ssp. nov.**

"♂ upperside. Ground-colour of a deeper shade of sky-blue than *loewii lockharti*, from which it further differs owing to the veins not having the appearance of being a whiter blue than the ground-colour; the marginal border wider than in *loewii lockharti*, and the veins towards the termen outlined with blackish scales. Fringes snow-white.



“♂ *underside*. Ground-colour pale grey (not pale whitish-grey as in *loewii lockharti*); submedian spots much larger and with more prominent white rings; discoidal spot (both wings) larger and rounder. *Fore-wings*. Submedian spot in Interspace 2 sub-ovate in shape instead of roundish. *Hind-wings*. A large bright orange-red (instead of yellowish-orange) submarginal lunule in Interspace 1B, and smaller similar lunules in Interspaces 1A and 2; blue metallic spots very small and weakly developed.

“♀ *upperside*. Uniform warm-tinted brown with a submarginal series of inter-neural orange dashes (2–3 mm. wide) to both fore- and hind-wings. This series is complete in all except 3 (out of 14) specimens in which there is an admixture of whitish with the orange scales towards the apex of the fore-wing. *Fore-wings* with a fairly wide brown marginal border with traces of brown inter-neural spots. *Hind-wings*. Brown marginal border very narrow, with a complete series of blackish marginal spots.

“♀ *underside*. Ground-colour pale brown, markings, etc., similar to those in the ♂, except that orange scaling is present in the submarginal lunules on the fore-wing.

“Length of fore-wing : ♂ 17 mm., ♀ 16 mm.

“Habitat : Anti-Lebanon, Baalbek.

“♂ holotype. ‘Baalbek, 13.6.1928, L. K. Lockhart’ (A. F. Hemming Coll. No. 24638).

“♀ allotype. ‘Baalbek, 13.6.1928, L. K. Lockhart’ (A. F. Hemming Coll. No. 24656).

“Paratypes in Hemming Coll.; ♂ 2, ♀ 1 placed in British Museum (B.M. Types No. Rh. 348–9 ♂, 350 ♀).

“Described from ♂ 9, ♀ 5 taken on 7.6.1928, and ♂ 26, ♀ 8 taken on 13.6.1928. Captain Lockhart states that *antilibanotica* was extremely local, being confined to one small and very steep gully.

“In the females the orange submarginal lunules at once distinguish *antilibanotica* from every other subspecies of *P. loewii*. The large size and clear bright blue of the ♂ is equally distinctive. The only other subspecies of equal size, *gigas*, Stgr., is quite different, having in the ♂ a brilliant shining gloss, not found in *antilibanotica*.

“The distribution of the various known subspecies of *P. loewii* may be summarised as follows :—

*Polyommatus loewii*, Zell.

(a) ssp. *loewii*, Zell.

*Lycaena loewii*, Zell., Isis, 1847, p. 9 : 1847. ‘Macri.’

*Lycaena empyrea*, Frr., Neu. Beit., vi, p. 147, pl. 573, fig. 1 ♂ : 1851. ‘Amasia.’

“In Western Asia Minor *loewii* occurs in the south-west, at Macri, where Zeller’s types now in the British Museum were taken by Löw, and further north at Kedos, where it was found by Major N. V. L. Rybot in 1918 (June 24th–July 10th). In the Graves Coll. are some specimens taken in Central Asia Minor at Akshehir by Wagner in 1928, and in the Hemming Coll. there is a pair from Konia. Specimens from Amasia, the type-locality of Freyer’s *empyrea*, are not separable from nominal *loewii*. The same is true of specimens from Askhabad and Ordoubad.

(b) ssp. *gigas*, Stgr.

*Lycaena loewii*, Zell., var. *gigas*, Stgr., Cat. Lep., ed. ii, p. 10, No. 139A : 1871. ‘*Lyd. alp.*’ (Ex errore).

*Lycaena loewii* var. *gigas*, id., Hor. Soc. Ent. Ross., xiv, p. 234 : 1877. ‘Taurus.’

"That the locality given in the original description, 'mountains of Lydia,' is a mistake was made clear by Staudinger in 1877, when he explained that the specimens on which he had based the name *gigas* in his *Catalogue* (1871) were taken by Lederer in the Taurus. The British Museum possess *gigas* from the Taurus (e.g. Gulek, 3000 ft.), one ♂ labelled 'Armenia. Sintenis 1888' and a series from 'Iraq (Mesopotamia). Staudinger (1877) records its capture by Haberhauer in April and May near Missis. Le Cerf (*Ann. d'Hist. Nat. Ent.*, ii, p. 63, 1913) records the capture of *gigas* in Persia (Poucht-e-Kouh, Galouzah, ♂ 1, 14.5.1899).

(c) ssp. *antilibanotica*, Hem.

Anti-Lebanon at Baalbek.

(d) ssp. *lockharti*, Hem.

Transjordan (type, Qasr Azraq), Lebanon, Palestine.

(e) ssp. *johannae*, Andres.

*Lycaena loewii*, ♀-ab. *johannae*, Andres, Ent. Rundsch., xxxiv, p. 24: 1917. 'Aegypten.'

*Lycaena loewii* var. *johannae*, Andres u. Seitz, Senckenbergiana, v, p. 49, pl. 1, fig. 26 ♀: 1923.

"*Johannae* is the extremely local Egyptian subspecies of *loewii*. So far as is at present known, *johannae* only occurs in the Wadi Riched near Heluan and in the Mokottam Hills.

(f) ssp. *chamanica*, Moore.

*Lycaena chamanica*, Moore, Journ. As. Soc. Beng., liii, (2), p. 23: June 1884. 'Chaman, S. Baluchistan.'

"In *chamanica* the ground-colour of the ♂ is purplish-blue and is much less brilliant than in other subspecies of *loewii* (except *sanoga*). The black marginal border is much narrower than in *sanoga*, but is rather broader than in the other subspecies of *loewii*. The ♀ is normally brown and rather resembles *lockharti* owing to the presence of whitish inter-neural streaks, which are, however, not so well developed as in that subspecies. *Chamanica* further differs in the ♀ from *lockharti* in the presence of well-developed orange lunules on the upperside of the hind-wings at the anal angle. The British Museum possess *chamanica* from Baluchistan (Quetta) and Persia (Schahrud). From the last-named locality there is a ♀ of a dirty pale blue colour, corresponding to the form *margaritae* of *lockharti*.

(g) ssp. *sanoga*, Evans.

*Lycaena loewii sanoga*, Evans, Journ. Bombay, N.H.S., xxx, p. 346, pl. 27, fig. 23 (5): Jan. 1925. 'Chitral to Ladak.'

"*Sanoga* is larger than any subspecies of *loewii* except *gigas*. It is so different in appearance that confusion is impossible. In the ♂ the ground-colour is dark purplish-blue and the black marginal border of both the fore- and hind-wings is extremely wide. The veins are outlined in black and so is the discoidal spot on the fore-wings. The ♀♀ are uniform dark blackish-brown, with two medium-sized yellowish-orange lunules at the anal angle. The ground-colour of the underside in both sexes is darker than in *loewii loewii*, and the submarginal lunules and submedian spots are heavier. The ♂ holotype in the British Museum is labelled 'Chitral, Kashmir, 20.6-10.7.1910. Major F. Wall' and the ♀ allotype 'Chitral, Drosh, 15.6.1902, G. A. Leslie and W. H. Evans.'



"*Loewii* belongs to the genus *Polyommatus*, Latr. (1805), as defined by Chapman (*Ent. Rec.*, xxii, p. 101, 1910) on genitalia characters. Its nearest ally is, probably, *meleager*, Esp. (1779)."

RARE COLEOPTERA FROM WINDSOR FOREST.—MR. DONISTHORPE exhibited specimens of *Atomaria morio*, Kol., a beetle new to Britain, which he had taken in a jackdaw's nest in Windsor Forest last November, in a large fallen beech tree. He also exhibited a number of other insects, etc., which had occurred with the *Atomaria*, and made remarks upon them. A complete list of the Arthropods found in the tree and nest is as follows:—

(1) In the tree:—A number of *Ludius ferrugineus* larvae, and other larvae of ELATERIDAE in the frass, *Pocota apiformis* in the dampest frass, *Dorcus parallelopepidus*, L., in the wood, and numerous larvae in the frass.

(2) In the jackdaw's nest:—*Microglossa gentilis*, Märk., 5; *Atheta nigricornis*, Th., 6; *Hypocypus laeviusculus*, Man., 2; *Philonthus fuscus*, Gr., 1; *Homalium rivulare*, Pk., 1; *H. rufipes*, Fourc., 1; *Dendrophilus punctatus*, Hbst., abundant; *Abraeus granulum*, Er., 2; *Enicomus minutus*, L., 1; *Atomaria morio*, Kolenati, new to Britain, 2; *Rhyncolus lignarius*, Marsh, 1; *Eryx ater*, F., larvae; Dipterous and Lepidopterous larvae; the fowl-flea, *Ceratophyllus gallinae*, Schr., 5; several examples of a Braconid *Chremylus rubiginosus*, Nees; a spider, *Leptyphantes carrii*, Jackson, 1 ♂; several Acari; *Chelifer panzeri*, C.L.K., 8; and *C. wideri*, C.L.K., 1.

*ECCOPTOGASTER RATZEBURGHII*, JANS., ON BIRCH IN SCOTLAND.—DR. R. STEWART MACDOUGALL showed examples of the work of this Scolytid beetle on the bark and main stem of birch. The mother and larval galleries marked on the stem were very numerous, as also in the bark. The mother galleries in the bark showed in a marked degree the numerous air-holes to the outside characteristic of this species. A specimen of birch stem obtained in Bavaria was shown for comparison, which had also been attacked by *E. ratzeburgi*. The special interest of this specimen was the clearness with which the marks of a woodpecker's bill were seen on the bark, due to the "percussing" of the bark for detecting the presence of insects, and of the actual wounds that followed as the bird dug in for them. The stem from Scotland had come from near Hawick in January.

*E. ratzeburgi* was first described in Britain from Perthshire, in 1856, and no further record was obtained for 67 years, until at Stobs Mr. Donald Fergusson with a party of forestry students found the beetle at work on sickly birch.

A PAIR OF THE ORIENTAL BUTTERFLIES *DANAIDA LIMNIACE*, CRAM., IN COITU, THE MALE BEING DEAD.—Prof. POULTON communicated the following observation by Major F. C. Fraser, M.D., I.M.S., recorded in a letter, written 5 November 1928, from Calicut, Malabar, to Dr. G. D. H. Carpenter in Uganda:—

"I observed a remarkable thing last month—I noted a pair of *Danaiida* (*Tirumala*) *limniace*, in cop., the male suspended with its wings *open*, quite contrary to the usual attitude. On capturing the pair I found that the male was dead—in fact so dry that I could crumble the body and wings—desiccated!! The female has apparently no means of freeing herself in the case of her mate dying."

Mr. O. W. Richards said that the male butterfly had probably been killed by a flower-haunting spider. A brown crab-spider (THOMISIDAE) had been observed hanging on to a dead female of *L. icarus*, Rott., which was being carried in the air, *in cop.*, by the male. K. Uffeln, *Zeits. wiss. Insektenbiol.*, 12, 1916, p. 41. "Ein gefährlicher Reiter (Spinne und Schmetterling)."

Prof. Poulton said that he had no doubt that Mr. Richards' explanation was the true one. He had seen many years ago in the collection of the late Major R. B. Robertson, then living at Bournemouth, the female of a common British Geometrid moth—he did not remember the species—bearing the abdomen of the male. It appeared probable that a bird, perhaps attracted by the fluttering wings of the male, had seized the insect, but that the female bearing part of the male had fallen to the ground and escaped in the undergrowth.

[Dr. R. Hanitsch has directed my attention to the following observation recorded by C. G. C. Trench, I.C.S., in the *Journ. Bombay Nat. Hist. Soc.*, XX, 1910–11, p. 876.

"I have this moment witnessed the following occurrence in my garden. . . . I was watching a bee-hawk moth, with clear wings, darting about over a bed of Zinnias. As it hung over one flower it suddenly was caught as if in a trap, and beat its wings violently. I took it by one wing, put it in the palm of my hand, where, in a moment or two, it died. I then looked at the Zinnia, and found squatting on it a lemon-coloured spider with a triangular body and long yellow legs. . . . The amazing thing was the strength of the spider in comparison to its small size. . . . Everyone knows what a vigorous creature the hawk-moth is. This was a very fine specimen, yet in under 15 seconds it was moribund. *Damoh, C.P.*, 30th July, 1910."

This interesting observation proves that the size of *D. limniace* would be no difficulty to one of these spiders; also that their poison acts with great speed.—E.B.P., 25 February 1929.]

THE LARVAE OF THE LYCAENID BUTTERFLY *SPALGIS LEMOLEA*, H. H. DRUCE, OBSERVED FEEDING ON COCCIDAE AT ZANZIBAR, BY J. E. M. MELLOR.—Prof. POULTON exhibited a male of *Spalgis lemolea* sent to him by Mr. J. E. M. Mellor, F.E.S., Senior Entomologist in the Ministry of Agriculture, Cairo. The carnivorous nature of the larvae of *Spalgis* was first described, in W. Africa, by Rev. A. C. Good (*Psyche*, Vol. VI, 1892, p. 201) an observation confirmed and extended by Dr. W. A. Lamborn, who, in 1911, found the larvae devouring COCCIDAE in S. Nigeria. The prey was determined by Prof. R. Newstead, F.R.S., as belonging to two species of *Dactylopius* (*Proc. Ent. Soc. Lond.*, 1911, p. civ; 1912, p. xviii; *Trans.*, 1913, pp. 475, 523).

The following note by Mr. Mellor was quoted from a letter, written 14 November 1928, on the s.s. "Speke," crossing Lake Kioga, Uganda :—

"I am sending you a specimen of *Spalgis lemolea*, H.H. Dr., the larvae of which were feeding upon ? *Icerya* sp. on a Cycad in the Governor's garden in Zanzibar. I had no net at the time when the larvae were at work and a few butterflies flitting about, but a spider most conveniently secured a specimen for me, and I secured the spider and its victim ! I obtained some *Spalgis* pupae which I bred out at Amani and gave the imagines to Mr. C. B. Williams. The pupae were greenish, turning partially to dark brown, as they matured."



Mr. Mellor wrote again, 23 January 1929, referring to the following extract from p. 22 of the *Ann. Rep. Uganda Prot. for the Year ending 31 December 1924* (Entebbe, 1925):—"It is interesting to record the occurrence of a Lycaenid caterpillar which on one estate at least most rapidly and effectively holds mealy-bug in check. The caterpillar is capable of eating a large number of its host; the chrysalis strongly resembles in miniature the features of a baboon's head. . . . When sufficient pupae become available, it is intended to introduce this Lycaenid predator into other districts where mealy-bug is a pest." Also from the same report for the following year, p. 26 :—"The Lycaenid *Spalgis limolea* [*lemolea*], Druce, which has been recorded as an efficient control of this species [*Pseudococcus citri*, Risso] in the Hoima District, has been found in Kampala feeding on *Pseudococcus virgatus*, Ckll., which attacks coffee and *Leucaena* (shade tree). A nearly full-grown larva has been observed to devour completely six full-grown female mealy-bugs in twenty-four hours. With the assistance of Neuropterous larvae and parasites this caterpillar efficiently controls *P. virgatus*, Ckll."

Mr. Mellor furthermore stated that he had been informed by Mr. G. L. R. Hancock, author of the annual reports referred to above, that *Spalgis* when it appeared wiped out the mealy-bug unaided and then vanished. It was a novel and charming fact that the larvae of a delicate-looking Lycaenid should be called to assist the economic entomologist. Naturalists were accustomed to such an alliance with certain fragile Heterocera, but not hitherto, he believed, with a butterfly.

The resemblance of the dorsal surface of the pupa of the African *Spalgis signata* (*lemolea*) and the Oriental *Spalgis epius*, Westw., to a monkey's face had been described and figured by E. H. Aitkin (*Bombay Nat. Hist. Soc.*, VIII, 1893-94, p. 485, pls. A, B).

A MALE BLACK AND RED BEE (*MEGACHILE*), OBSERVED AT AMANI, T.T., BY J. E. M. MELLOR, CHASING, PROBABLY ATTRACTED BY THE COLOURS OF ITS OWN FEMALE, AN ACRAEINE BUTTERFLY.—Prof. POULTON exhibited the male *Megachile combusta*, Sm., and male *Acraea insignis*, Dist., referred to in the following extract from Mr. Mellor's letter of 14 November 1928, quoted in the preceding communication :—

"Instead of going to England this year, I have spent my leave in East Africa and am very glad to have done so. I went in at Zanzibar, where I spent a week and then to Tanga and so to Amani, where I spent three weeks.

"One day whilst watching a black and red ♂ *Megachile* (sent you under separate cover from Kampala), basking in the sun on the leaf of some plant, outside Mr. C. B. Williams' house at Amani (Tanganyika: 3000 ft.), a ♂ *Acraea insignis*, Dist., flew by. Although other butterflies were about, the bee immediately gave chase to the *insignis*, pursued it for about ten yards, and then returned to a spot close to the one where it had been basking. It did not press the chase nor come to grips with the butterfly. I waited for some time to see if it would resume its activities, but as it did not show any signs of doing so, I caught both bee and butterfly to make sure of the determinations. Scarcely had I placed them in my jar, when another bee of the same species (a male also) chased another *insignis* in exactly the same manner. These also were captured. Two days later when on Lion Hill, Amani, I saw the same thing happen again. I thought you would be

interested and perhaps have an explanation, which I should be very glad to hear. Could the bee have momentarily mistaken the *Acraea* for its own female? The similarity in coloration was striking when the insects were seen in life—the bee appearing much brighter than it does as a dead specimen. I was not at the moment thinking of mimicry, but was at once forcibly struck by the resemblance of colouring.”

It was probable that the male bee, in the absence of its female, received the kind of stimulus that would have been conveyed by her coloration. Mr. Mellor's very interesting observation, three times repeated, threw much light upon the researches of Monsieur Pouyanne and Colonel Godfery, briefly described in *Proc. Ent. Soc. Lond.*, II, 1927, p. 19, and those of Mrs. Coleman published in *Trans. Ent. Soc. Lond.*, 1928, p. 533.

The *A. insignis* was of the form *siginna*, Suff., characteristic of the locality. This butterfly, and particularly the f. *siginna*, is remarkable among *Acraeas* for the broad unbroken masses of red and black which make up its pattern and probably account for the effect upon a bee which is normally attracted by the simple red and black coloration of its own female. The female *insignis*, with its red colour paler than that of the male and varying to a pale dull brown, would be less likely to produce the same effect, and it was to be noted that the butterfly sent by Mr. Mellor was a male; furthermore that the male is in all probability far more commonly seen upon the wing than the female.

MR. E. STEP'S OBSERVATION THAT THE GALLS OF *CYNIPS KOLLARI*, HART, ARE OPENED BY BLUE-TITS.—Prof. POULTON exhibited a photograph of bullet-galls two of which were seen to have been opened. The photograph had been kindly given to him by Mr. Edward Step, F.L.S., who had written an account of the circumstances in the following paragraph. It was of much interest to be able to add the Blue-tit to the birds mentioned in *Proc. Ent. Soc. Lond.*, III, 1928–29, pp. 50–52.

“The photograph was taken on 2 January, 1911, from galls of *Cynips kollari* formed on new growths from the stump of an oak that had been felled, near the footpath running from Slyfields to Fetcham, Surrey. I had previously found bullet-galls in Ashted Woods that had been treated in this manner, and had (without evidence) attributed the work to Woodpeckers—perhaps correctly. On the date named, however, I was somewhat surprised to see a Blue-tit engaged in this work; but as I was only a few yards away the bird flew off when it saw me. Only the two shown open in the print had been attacked: all the others were entire, and not one showed signs of emergence of the insect. This would not happen until several months later, for all the galls had obviously been formed in the summer of 1910. I have no doubt that, had I left the galls, all would in turn have been explored by the bird. I should imagine they all had larvae within.

“Respecting the name. When I was a lad (say in the eighteen-seventies) these were known as ‘Devonshire Bullet-galls.’ I never heard them referred to as ‘Oak-apples’ until recent years, and then only by Cockneys.”

A BLATTID PEST IN UGANDA HOUSES.—Prof. POULTON said that Capt. Pitman had now sent males of this cockroach of which the female had been described in



*Proc. Ent. Soc. Lond.*, III. p. 49 n., 1929. Dr. Hanitsch had therefore completed his account of the species by adding a description of the male.\*

THE RESEMBLANCE OF THE AUSTRALIAN HEPIALID MOTH *LETO STACYI*, SCOTT, TO THE HEAD OF A LIZARD.—Prof. POULTON said that Mr. R. J. Wilkinson had recently maintained that the mimetic resemblance of insects to Vertebrate animals had been overlooked, and he therefore exhibited several lantern illustrations of examples which had long been recognised—one of them by H. W. Bates when he wrote of an Amazonian snake-like caterpillar on p. 509 of his classical memoir.† Another example likely to be overlooked by many naturalists was described as follows in 1895 by F. A. A. Skuse ‡:—

“That wonderful Hepialid, *Leto stacyi*, Scott, seems to claim a place among those famous examples of a similar nature advanced by Bates, Wallace, and others. . . . I cannot find any reference to such a protective feature as that of a moth which resembles *in situ* an approach to the head of a reptile known to possess an appetite for birds. In the case under notice it may fairly be claimed that such an example exists in nature.”

The author's colleagues inspected “photographs of actual specimens in their natural positions,” and “it was agreed that the moth represented sitting on a tree-trunk forcibly reminded one of the head of the tree-lizards, members of the genus *Varanus*. . . . It is the ‘eye’ on the wing of the moth that strikes the key-note of the situation; but in addition the shape of the wing, when the moth is resting, looks very suggestive. . . . On emergence the perfect insect is not prone to fly, and would therefore be very liable to be attacked by birds. Hence the probability that my surmise of the striking resemblance to the head of the lizard being an instance of genuine protective imitation is correct.

“The reptile photographed was not very specially selected, and others might perhaps have been used wherein certain features were more strongly marked. For instance, many members of the genus *Varanus* have a dark line passing from the eye backwards.

“ . . . The marks on the outer margin of the visible wing of the moth are very suggestive of labials, while the various lines in front savor of the regularity of scales. Some of these tree-lizards and the moth are natives of New South Wales.”

\*

#### *Ischnoptera pitmani*, Hanitsch.

The description of this species, based upon two ♀♀ specimens, dated “Entebbe, Feb. 1928” (*Proc. Ent. Soc. Lond.*, Vol. III, p. 49 n., 1929) may be supplemented by that of two males, since received from Capt. Pitman. Both were taken at Entebbe, 3900 ft., October 1928.

The ♂ differs from the ♀ as follows: colouring of the head of the ♂ reversed from that of the ♀, viz. vertex castaneous instead of black; face black, instead of castaneous. Pronotum dull orange, with obscure darker markings, but the two indefinite V-shaped blotches present in the ♀ not noticeable in the ♂. Tegmina with 18 costals, instead of 16 in the ♀; costal 13 bifurcate, 14 simple, 15 and 16 ramose, 17 simple; posterior branch of radial simple, instead of ramose. Wings with 9 costals, as in the ♀, but the 7th and 8th ramose, instead of the 5th and 8th; ulnar sending 2 branches to the dividing vein, and 2 to the apex, instead of 1 and 3 respectively in the ♀. Supra-anal lamina triangular as in the ♀. Sub-genital lamina asymmetrical, roughly triangular, with an indentation on the right side of the triangle; one of the two styles placed at the apex of the triangle, the other in the middle of the right side.

♂. Total length 16.5 mm.; body 12 mm.; pronotum  $3.3 \times 4$  mm.; tegmina 13.5 mm.—R. HANITSCH, 25.1.29.

† *Trans. Linn. Soc. Lond.*, Vol. XXIII, 1862. The identification of Bates' larva as a Sphingid is due to the Rev. A. Miles Moss (*Trans. Ent. Soc. Lond.*, 1926, pp. 581–3).

‡ *Records of the Australian Museum*, Vol. II, No. 6. Sydney, Sept. 1895: “On a Case of Presumed Protective Imitation,” by F. A. A. Skuse, Entomologist to the Australian Museum: Pl. XXII, f. 1, lizard; f. 2, moth, natural size, pp. 91, 92.

THE FORMS OF *COLIAS EDUSA*, L. (*CROCEUS*), CAPTURED AND BRED IN S. DEVON DURING THE PAST SUMMER AND AUTUMN.—Mr. J. F. PERKINS exhibited a fine series of *Colias edusa* consisting of 254 specimens obtained in S. Devon, in localities from Newton Abbot to Bolt Head. Of these 136 were caught at large, and 118 bred, but a number of bred ♂♂, and a few bred ♀♀, were not kept.

Of the specimens caught in August and September, 47 were typical ♀♀ and 49 pale forms. Most of these latter were referable to var. *pallida*, and contrasted strongly with the later-bred specimens, which were much yellower in tint. The series consisted of picked specimens, for the typical females were extraordinarily numerous and the pale forms common. On some days a score or more of the latter were seen.

The series of 42, bred from three typical females caught in August, included 15 typical females and 5 pale forms. It was therefore probable that the ♂ parent of one or more of these was carrying the factors for *helice*.

The series of 76 bred from several pale females caught in August contained 20 typical and 21 pale females. These latter were transitional from pale *helice* into *edusa*, and so gradually that some of them could not be definitely referred to either form. It was noticeable that the discal spot was partly or largely pale in many of the males, while no such appearance was met with among the captured specimens of the August and September brood.

Very few of the large number of larvae which hatched survived in captivity, disease being very prevalent amongst them and always fatal. Of the innumerable eggs that were laid in Devon fields during September probably not one produced a butterfly. Most of the bred series emerged in November in a warm, but not specially heated room.

Prof. POULTON said the interesting results yielded by the pale female parents confirmed those recorded by Mr. L. W. Newman in *Proc. Ent. Soc. Lond.*, II, 1927-28, p. 47, namely 112 ♂, 49 ♀ *croceus*, 47 ♀ *helice*. These facts were explicable on the hypothesis that the female parents were heterozygotes which, mating with recessive males, would produce approximately half recessives (*croceus*) and heterozygotes (*helice*). The proportion of *croceus* to *helice* in the wild state enabled one to form an approximate estimate of the proportion of males carrying the factors of *croceus* to those carrying *helice*, and from this to infer that the chances were immensely in favour of any single *helice* being a heterozygote whose male parent was carrying the much commoner recessive and not the rarer heterozygote or dominant.

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Wednesday, March 6th, 1929.

Dr. K. JORDAN, President, in the Chair.

*Proposed Changes in the Bye-Laws.*

The SECRETARY read for the second time the proposed changes in the Bye-Laws of the Society to be considered at a special meeting in April.

*Exhibits.*

BUTTERFLIES FROM THE HERZOG MTS. IN EASTERN NEW GUINEA.—The PRESIDENT, referring to the butterflies exhibited, said that the specimens were col-



lected by Mr. A. F. Eichhorn at 6100 ft. in the district inland from Huon Gulf, where gold had been recently discovered. Unfortunately Eichhorn completely broke down in health and had to be transported to the coast. The collection of some 420 specimens might therefore be taken as representing on the whole the commoner species of that altitude. The majority of the butterflies belonged to the genus *Delias*, as was to be expected, no less than 16 species being obtained. Equally numerous in specimens were three small Satyrines: *Pieridopsis virgo*, R. & J. 1905, *Platyphima homochroa*, R. & J. 1907, and *P. decolor*, R. & J. 1905. While the last two species have preserved the colour and pattern of Meadow Browns, *P. virgo* has, on the upperside, quite the appearance of a *Delias*, being white with the apex of the fore-wing black. The upperside of this butterfly does not vary much; evolution evidently has arrived at a satisfactory result in modifying this Satyrine into a form with a Pierine aspect. The underside of *P. virgo*, on the other hand, is in a state of great flux, varying from being white with a pattern of black bands to being almost entirely black. I draw special attention to the fact that the white colour is preserved at the hind margin of the black fore-wing; this area being covered by the hind-wing, it seems to follow that visibility is a factor in the process of melanisation. It is somewhat surprising to note that nature, after having turned a Meadow Brown into a white butterfly, is evidently at work to wipe out the white colour of the underside by replacing it by black. Black and white being opposites in physics, one might rashly conclude that evolution jumped in this case from one extreme colour to the other. But the black colour of the under surface, which is different from the black of the bands, probably is chemically closely akin to the white pigment (neither the one nor the other being physical extremes), the difference in aspect being possibly due to higher oxidation in one than in the other. Biochemistry can clear up such points, and will, no doubt, become in future of the greatest importance for the understanding of colour modifications in species. Among the *Delias* exhibited several show the same process of the darkening of the underside.

AN EARLY WORK OF F. W. L. SLADEN.—Dr. S. A. NEAVE exhibited a small pamphlet by the late F. W. L. Sladen entitled "The Bumble Bee; its Life History and how to domesticate it," published and printed in 1892 by him when a boy, which he proposed to present to the Society's library.

OBSERVATIONS ON MALAYAN INSECTS BY CAPT. H. M. PENDLEBURY.—Prof. POULTON said that he had quoted the following interesting observations from a letter written by his friend Capt. Pendlebury at Kuala Lumpur, F.M.S., on 22 January 1929:

1. *The evening flight of Geometrid moths of the genera Dysphania and Milionia.*—I intended, a long time ago, to send you some additional notes on Dysphanias flying on Bukit Kutu, but, as my observations were incomplete owing chiefly to rising mists and/or gathering darkness which limited one's field of observation to a very small compass, I deferred putting anything on paper until I had further opportunities to study this phenomenon. I have not been able to visit Bukit Kutu since 1926, but early this year I was on Kedah Peak, and witnessed similar behaviour on the part of *Milionia pyrozonis*, Btlr., as I have told Mr. L. B. Prout, who has been working

out our GEOMETRIDAE. In both cases it appeared to me that it was not a question of a "migration," but more of an evening flight. On Bukit Kutu (3450 ft.) the *Dysphanias* seemed to appear from nowhere in particular at about a quarter to six in the evening and fly around the great boulder that marks the summit, until about 6.20–6.30 p.m., when they dispersed not necessarily in the same direction. The *Milionias* likewise appeared about the same time every evening, flying sometimes about 20 feet above the ground, and in a scattered formation following elliptical courses round the hill-tops (3300–3900 ft.). I also observed the *Milionias* by day, flying about in the noonday sun, but not by any means plentifully. For instance, one might see two in one morning, three the next, one the next and so on, but it seemed to be the evening when they were really active.

2. *Resting attitudes of moths*.—Another subject that I should like to look into is the resting attitude of various moths. Some of these are so extraordinary that I have very frequently had to touch the insect before I could be certain whether it was a moth, or merely a dried leaf. Some species, especially of *Anuga*, Guén., *Eutelia*, Hüb., etc., seem to be able to contract their wings (on the longitudinal plane) when resting, and turn up the end of the abdomen—not necessarily vertically, but sometimes to one side, in such a manner as is likely to deceive not only the uninitiated! By resting I do not imply that they are necessarily in their natural surroundings, for I have seen them resting on pink curtains, window-panes and white walls, and even then it is very difficult to make them out, especially if their thoracic and abdominal crests are raised. I wish I were an artist able to depict faithfully what I see—but then perhaps I should not be believed!

I am trying to give you a slight impression of a species of *Eutelia* or *Bombotetia* resting, somewhat in the manner I have been attempting to describe. The general coloration is that of a dry leaf—dark chocolate-brown, or black.

[An accompanying sketch showed a prominent dorsal crest on thorax and adjacent abdominal segments, a forked apex to the upturned abdomen, and narrow, probably rolled-up, dependent wings, extended on each side, the whole effect being very un-mothlike.]

The abdomen is rather more contracted than shewn, and wrinkled, the head and antennae being tucked away and partly hidden by the patagia. The species of the genus *Stictoptera* also are very difficult to distinguish when resting, but they assume a normal attitude.

3. *Mimetic Malayan Coleoptera, etc.*—During this collecting tour in Kedah and the Langkawi Is. off the west coast, I secured a number of interesting things, including a specimen which agrees well with the description and figure of *Coloborhombus fasciatipennis*, C. O. Waterh. (*Trans. Ent. Soc. Lond.*, 1885, p. 369, pl. x, fig. 12). My specimen is slightly larger, but is an admirable mimic of the big Pompilid wasp, *Hemipepsis ducalis*: I also took a specimen of *Coloborhombus hemipterus*, Oliv., at the top of Kedah Peak. This, when in flight, bears a great similarity to another Pompilid wasp, viz.: *Macromeris violacea*.

Another interesting capture was a specimen of *Zelota spathomelina*, Gah. (*P.Z.S.*, 1902, p. 274, pl. xxiii, fig. 57; *Hope Reports*, Vol. IV., Memoir 4).

Whilst looking up Pryer's paper in the *Trans. Ent. Soc.* (supra) I realised that



we also have a specimen of the other interesting mimic mentioned. It agrees very well with the figure and description of *Scoliomima insignis*, Btlr. (pl. x, fig. 10), a mimic of *Scolia patricialis* var. *plebeja*. The specimen was taken on Bukit Kutu (possibly by Dr. Hanitsch) in 1915.

Prof. Poulton said that the evening flight of the Geometrid moths appeared to be different from that observed on Bukit Kutu by A. R. Sanderson and T. R. Harvey, when the Dysphanias accompanied their *Delias* models and were accompanied by a Chalcosine mimic (*Proc. Ent. Soc. Lond.*, 1920, p. lxiii; 1921, p. xii). It seemed probable that the explanation of the evening flight witnessed by Capt. Pendlebury was that given in *Proc. Ent. Soc. Lond.*, 1904, pp. xxiii, xxiv, viz. the manifestation of an instinct to seek hill-tops and other elevations, thus reducing the area over which the sexes find each other and facilitating the pairing of individuals scattered over a wide expanse of country.

RESTING ATTITUDES OF MOTHS OBSERVED BY C. B. WILLIAMS AT AMANI, E. AFRICA.—Prof. POULTON exhibited an example of the Geometrid moth *Coenina aurivena*, Butl. (BOARMIINAE) set by Mr. C. B. Williams so as to preserve the natural resting position similar to Dr. G. D. H. Carpenter's figure in *Proc. Ent. Soc. Lond.*, 1925, p. lvii. The specimen had been taken, 24 September 1928, on the Kwamkoro Downs, Amani, Tang. Terr.

In the same consignment Mr. Williams had sent another Geometrid, *Coptopteryx* sp., considered by Mr. L. B. Prout to be a form of *aino*, Bryk, or perhaps the eastern race of *specularias*, Holl. The moth itself had been temporarily mislaid in the British Museum, but would be exhibited at a later meeting. Two interesting drawings by Mr. J. McHardy, showing the curvature of the wings as seen from the side and front, were exhibited. The rarity of the moths of this genus in collections was probably due to the perfection of their procryptic resemblance to a crumpled dead leaf.

A third moth, a Deltoid apparently not in the British Museum Collection, was exhibited together with the drawing referred to in the following passage from Mr. Williams' letter of 30 January 1929. "I am sending herewith a moth which seems to represent an early stage in the 'wing-rolling' process, and a rough pencil sketch from life by McHardy. It has kept slightly the fold of the wings exhibited in life. The habitat was the usual one—my sitting-room wall!" The date was 9 January 1929.

In determining the species kind help was given by Mr. L. B. Prout and Mr. W. H. T. Tams.

REVERSION TO THE ANCESTRAL TAILED FORM OF FEMALE *PAPILIO DARDANUS* CAUSED BY SHOCK.—Prof. POULTON exhibited a female *P. dardanus*, Brown, of the form *cenea*, Stoll, from Nairobi, sent by his friend Dr. V. G. L. van Someren. The specimen bore the label:—"One of 4 larvae submitted to shock. The other 3 normal." The accompanying letter also referred to it as "a tailed *cenea*, a shock-specimen." It possessed small but well-marked tails equally developed on both hind-wings. No trace of the male yellow pigment could be detected by its fluorescence when the butterfly was exposed to ultra-violet light in the dark-room, and it appeared evident that the shock had produced reversion and not, as in so

many other examples, a gynandromorph. The nature of the shock was not recorded, but it was almost certainly due to a mechanical jar\* similar to that which produced gynandromorphs of *dardanus* as described and figured in *Proc. Ent. Soc. Lond.*, Vol. I, 1926-27, p. 71. In one of these, however, it was shown later that other probably reversionary effects had been superposed on the gynandromorphism (*ibid.*, Vol. II, 1927, p. 34). It should also be noted that the exhibited *cenea* ♀ was much below the normal size, while some of the dwarfed females of *dardanus*, bred by Mr. C. F. M. Swynnerton in S.E. Rhodesia, also exhibited indications of hind-wing tails (*ibid.*, 1914, pp. lvii-lxiii). It was therefore probable that the tendency towards reversion set up by the shock was strengthened by the conditions which led to a diminished size.

LATE APPEARANCE OF *PIERIS BRASSICAE*, L., IN 1928.—Prof. POULTON said that Mr. O. H. Latter had sent him the following note, which in the absence of his friend he communicated to the meeting:—"On 26 November 1928, I saw a specimen of *Pieris brassicae* flying about just outside my garden [at Godalming]. November was extraordinarily mild—the warmest on my records kept for 38 years. I imagine the butterfly must have emerged prematurely from the pupa."

DRAGONFLIES AS ENEMIES OF TSETSE, ETC.—Prof. POULTON said that the following interesting note on this subject had been copied from Mr. J. E. M. Mellor's letter of 23 January 1929:—

"On 11th November 1928, G. L. R. Hancock (Assist. Ent. Dept. of Agriculture, Uganda), Dr. Hoare (Pathologist to the Wellcome Bureau of Scientific Research), and I went over in a canoe to a small island called Mfo, in Lake Victoria, about two miles off old Entebbe. As we landed we were met by swarms of *Glossina palpalis*, very flat and very hungry. We were, however, reassured by Hoare, who told us that he had examined great numbers of *G. palpalis* from here and the coast and never yet found a trypanosome. There were also multitudes of Dragonflies of several species flying low over the sandy soil of that part of the islands. Their manner of flying and the crowds of fly at once suggested that they were after Tsetse. Hancock saw one, a *Brachythemis*, take and eat a *Glossina*.

"Elsewhere on the island Dragonflies were to be seen everywhere, above the bushes and high above the trees. There were also great numbers of Chironomids, and I fancy that perhaps these formed the quarry aloft, whilst the Tsetse were being chased nearer ground-level. The numbers were striking. We thought the island should be renamed Dragonfly Island! I made a collection of as many of the Dragonflies as possible, and hope all will be identified.

"Lamborn has I know recorded *Orthetrum chrysostigma* and *Crocathemis erythraea* as taking Tsetse (*Bull. Ent. Res.*, Vol. VI, 1915-16, p. 252)."

THE UVAROV THEORY OF LOCUST MIGRATION AND ITS POSSIBLE BEARING UPON BUTTERFLY MIGRATION.—Prof. POULTON introduced a discussion on insect migration

\* Dr. van Someren, who has just returned to England, informs me that "the method of producing the shock in this case was slightly different from that employed previously, in that the larvae, when just about to shed the skins and emerge as pupae, were placed on a light wooden tray and the bottom of the tray sharply tapped with a light hammer from below. This method produces a greater degree of vibration; in fact rather too strong, for some larvae get bruised." E.B.P. 27 April 1929.



considered in the light of the facts and interpretations brought forward in Mr. B. P. Uvarov's "Locusts and Grasshoppers," published in 1928 by the Imperial Bureau of Entomology.

Uvarov's theory, originally suggested in a tentative form in *Bull. Ent. Res.*, Vol. 12, 1921, p. 135, was based on the study of the migratory locust of the Russian Steppes, but it has now been found to hold for some other migratory locusts in other parts of the world. According to this theory, two Russian locusts, formerly considered to be distinct species, differing in structure, coloration, and behaviour, are the dimorphic forms of a single species—one of them, hitherto known as *Locusta migratoria*, migratory, the other, known as *L. danica*, non-migratory. *Danica*, especially in the immature hopping stages, varies in colour far more than *migratoria* and is more often green. Its hoppers tend to develop colours which harmonise with the environment; while the hoppers of *migratoria* possess a black and orange-red or yellow coloration. The sexes of *danica* are about equal in size, while the males of *migratoria* are distinctly smaller than the females. They also, unlike *danica*, become bright yellow on attaining sexual maturity. In spite of these wide differences, specimens intermediate between *danica* and *migratoria* are constantly found. The possible transformation of one into the other was first suggested when swarms of typical *migratoria* invaded the Stavropol Province of the Northern Caucasus in the autumn of 1912, and laid eggs which, in the following year, produced a considerable proportion of the hoppers and later the mature forms of *danica*. It was then proved by experiment that the reverse change is brought about by over-population, the eggs of *danica* yielding *migratoria*—both hoppers and mature forms—when several instars have been passed in a crowded cage. Therefore, in this locust and probably in all with a migratory form, this latter, with its structural and instinctive characteristics, is a phase evoked by some stimulus associated with overcrowding.

In reading Uvarov's deeply interesting Chapter VII, on the "Periodicity of Mass Outbreaks," it occurred to me that there was probably a significant relationship between the conspicuous coloration and the gregarious habit of the migratory hoppers. The conspicuousness of gregarious insects is generally increased by aposematic colours and often by movements and attitudes. It would be extremely interesting to undertake special experiments in order to test the edibility of the hoppers of both phases. It is not here suggested as probable, although it is possible, that the edibility of the procryptic, solitary hopper differs from that of the conspicuous, gregarious hopper of the same species; but, if it be granted that both phases are to a certain extent unpalatable to some of their enemies, then the advantage of an aposematic appearance in that phase which is necessarily advertised by crowding, is I think evident. It is also, I believe, probable that the results of Plotnikov's experiments (described by Uvarov on p. 168), in which the normally green hoppers of *Aiolopus tergestinus*, Charp., became grey when crowded, are to be explained by colour-susceptibility, just as the dark pupae of *Aglaia urticae*, L., and some other species, are produced by larvae which are suspended near together and thus influence one another. The effect of susceptibility to the colours of their surroundings, is the natural interpretation of Burchell's notes, in 1811-15, on S. African ACRIDIDAE and of many other observations on the same family brought together in *Internat. Entomolog.-Kongr., Zürich, 1925, Vol. II, 1926, p. 433.*

Uvarov's most interesting results suggest the possibility that insects of other groups may be adapted to respond in a similar manner to the same kind of stimulus. The experiment would not be difficult to make and is well worth trying, even with butterflies in which the migratory instinct has hitherto been believed to appear in response to overcrowding in the mature stage and the want of available food-plants on which to deposit eggs.\* Certain migrating butterflies, such as *Belenois mesentina*, pair and lay eggs before and during migration; in others, such as *Libythea laius* and *labdaca* (see p. 22), these functions are apparently delayed, as they are in the migrating Acridians. Experimental overcrowding in the larval stage would be more likely to yield positive results in this latter class.

Mr. B. P. UVAROV said that it may be considered as fully established that the migration of locusts is a phenomenon most closely connected with the rate of development of the sexual products. In the solitary forms of locusts these products are almost completely developed at the attainment of the adult stage; in the swarming forms the genital products of young adults are comparatively immature and a migratory flight seems to be necessary for their full development. Observations, conducted mainly by Russian zoologists, prove that in migrating Lepidoptera the genital products are also often in a backward condition. Thus, it would seem that, in both groups of insects, the stimulus to migration may be a physiological one, and it is most desirable that, in the suggested experiments on butterfly migration, special attention should be paid to the rate of development of the genital products under different conditions of crowding, temperature, humidity, etc.

Mr. FRYER said that as a result of his experiences in Ceylon in 1911 and 1912, he was able to confirm the observation that *Belenois mesentina*, when migrating, is nevertheless sexually mature. At Peradeniya females of this species, when on migration, were often observed to stop and lay eggs on bushes of *Capparis pedunculosa*, rejoining the migratory flight as soon as a few eggs had been laid. *Capparis* bushes, after the passage of a flight, were found to carry an abundance of Pierine eggs (*B. mesentina*, *Ixias pyrene*, and *Huphina nerissa*) although previously such eggs were scarce or absent. *Papilio polytes* was also found to be sexually mature when on migration, and females were frequently observed to leave the migrating stream and after laying a few eggs to rejoin the flight and continue migrating.

In regard to the possible causes of migration in *Papilio polytes*, Mr. Fryer did not think that overcrowding in the larval stages provided the necessary stimulus, because, in his experience in the low country jungle of Ceylon, the population of *Papilio polytes* was reduced in numbers by migration well before any larval overcrowding occurred, and it would seem that such migration assists in preventing larval overcrowding and possibly death by starvation, which might otherwise be not improbable in certain seasons. That overcrowding in the larval stage does not give rise to a migratory instinct in the adults was further indicated by certain experiments at Peradeniya, in the course of which large numbers of *polytes* larvae were reared under conditions which resulted in extreme overcrowding (although not, of course, starvation). The adults, on emergence, were released in a large cage (16 feet ×

\* Trimen, *South African Butterflies*, Vol. I, 1887, pp. 31, 32; see also *Trans. Ent. Soc. Lond.*, 1902, pp. 462-65; *Proc.*, 1921, pp. xii-xxvii.

4 feet  $\times$  6½ feet) of wire netting. Contrary to expectation, it was found that the butterflies were easily able to crawl through the mesh of the netting used, but that they never attempted to do so if well fed. It may reasonably be assumed, therefore, that if the butterflies had emerged with a strongly developed migratory instinct, they would not have allowed themselves to have remained captive within this cage. For a period of nearly a year, however, the cage was in constant use, and the only escapes were those which could be definitely attributed to a neglect to provide sufficient food (or moisture). During this period at least two well-marked migratory waves of *P. polytes* passed the cage, but the impetus to migrate was not conveyed to individuals within the cage.

The PRESIDENT remarked on the great importance of Mr. Uvarov's discovery, and expressed the hope that Entomologists would pay attention to and record the movements of insects of which we knew very little. He mentioned from his own experience two cases as illustrations of what he wished to convey. He observed in the Harz Mts., in the neighbourhood of St. Andreasberg, a large number of larvae of a Chrysomelid beetle, probably *Adimonia*, feeding on a low-growing plant; the place cleared by them distinctly proved that the larvae had been feeding in one direction only, instead of spreading in all directions as one would have expected, the food-plant being abundant all round. The other experience was in the Alps: when coming down the Meien Valley from the Susten Pass towards evening he noticed every now and again a specimen of *Pterostichus madidus* crossing the path (which is in a meadow not far from the brook), and was struck by the fact that all the specimens ran in the same direction, as if they were returning from somewhere or were in a hurry to get somewhere else. One would like to have the explanation of such details in the daily life of insects.

Prof. POULTON said that he did not doubt that the migration of sexually mature butterflies was to be interpreted along the lines suggested many years ago, viz. the awakening, at first by unfavourable conditions and then by a social stimulus, of an instinct, present but otherwise dormant, in the imago. The importance of the social stimulus had been clearly demonstrated by Mr. C. B. Williams' observations on *Catopsilia statira* in Trinidad. When one of these migrating butterflies was disturbed by attempted capture it "flew off wildly in any direction," and at once caused confusion in other butterflies near at hand, "so that after several misses in succession," Mr. Williams "was surrounded by a number of butterflies flying in all directions." When they were no longer disturbed "the regular direction of flight would be resumed" (*Trans. Ent. Soc. Lond.*, 1919, p. 85). The experiences which had just been described by Mr. F. Muir afforded a convincing and striking proof of the power of this social stimulus—the sweeping up of the non-migrating butterflies on a Papuan island when a migratory flight from another island passed over it. In this instance, in which more than a single species was involved, it is evident that the social stimulus and this alone availed to compel the non-migrating butterflies to become migrants—with such success indeed that the island was comparatively depleted of these species after the migratory stream had passed. The fact that Mr. Fryer's bred *polytes* were not affected by the migrants of this species outside the cage may have been due to distance. Specially directed observations for the



determination of the distance at which the social stimulus may operate would be of much interest. It may be repeated that, as Mr. Uvarov has implied, the most hopeful line of experiments would be upon species in which the reproductive activities are delayed until after a migratory flight.

BRITISH PREDACEOUS INSECTS AND SPIDERS WITH THEIR INSECT PREY.—Mr. W. J. LUCAS exhibited the following examples of predaceous species and their prey, taken by him at the recorded localities :—

1.—Two ants, *Formica rufa*, L., were hanging on firmly to the hind legs of a *Geotrupes sylvaticus*, Panz., which was walking at a fair rate. The beetle was boxed with the ants still hanging on. After a time it was transferred (ants still attached) to a cyanide bottle. All three died, but the ants still remained attached. Rhinefield, New Forest : 14 Sept. 1921. Similarly, on 23 June 1928, in the New Forest two workers of *Formica rufa*, L., were seen carrying away a dead male of *Forficula auricularia*, L. One held it by the neck and the other by one branch of the callipers. They were boxed as they held it. Later it was abandoned after being dismembered—with legs, head, and antennae severed.

2.—A worker of *V. rufa*, L., which was struggling on the ground with a Noctuid moth, *Eurois prasina*, Schiff. (*Aplecta herbida*, Hübn.). New Forest : 5 July, 1928.

3.—A *Vespa vulgaris*, L., taken with its prey, the Anthomyid fly *Polietes lardaria*, F. Stoke Woods, nr. Exeter : 23 Sept. 1928.

4.—An Asilid fly, *Dysmachus trigonus*, Mg., with its victim, a Green Oak Moth, *Tortrix viridana*, L. New Forest : 3 July 1922.

5.—A dragonfly, *Pyrrhosoma nymphula*, Sulz., with its prey, the Plecopteron, *Leuctra hippopus*, Kempny. The dragonfly managed to escape while the pair were being boxed. The Plecopteron, though dismembered, was quite identifiable. New Forest : 8 May 1928.

6.—A bright yellow spider, *Philodromus aureolus*, Clerck, which had captured a *Coenonympha pamphilus*, L. New Forest : 16 June 1922.

7.—A bright pink spider, *Philodromus aureolus*, Clerck, seated on a rather precocious plant of heather in flower. The spider had captured an *Ammophila campestris*, Latr. Foot of Ramsdown, near Hurn, Hants : 4 July 1928.

The spiders were kindly named by Dr. Randell Jackson. The subspecies could not be determined in the dried specimens. The moth *Eurois prasina*, in a terribly damaged condition, was kindly determined by Mr. W. H. T. Tams, who examined the armature.

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### Wednesday, March 20th, 1929.

Dr. K. JORDAN, President, in the Chair.

#### Obituary.

The PRESIDENT announced the deaths of Mr. A. E. WILEMAN and Mr. S. L. MOSLEY, Fellows of the Society.

#### Election of Fellows.

The following were elected Fellows of the Society :—EDITH MAY LYALL, 57, Mortlake Road, Kew Gardens, Surrey ; STEWART MACLAGAN, B.Sc., Farnham House

Laboratory, Farnham Royal; Dr. G. S. GRAHAM-SMITH, Pathological Laboratory, Medical School, Cambridge; DEREK SHANNON, Gothic Cottage, Four Oaks Road, Four Oaks; Major F. W. BEWSHER, D.S.O., O.B.E., M.C., 2nd Batt., Devon Regiment, South Raglan Barracks, Devonport; HARRY DINNAGE, 30, Stable Cottages, Lower Beeding, Horsham; BOTHA DE MEILLON, The South African Institute for Medical Research, Johannesburg, South Africa; HAROLD W. DALTRY, Bar Hill, Madeley, Nr. Crewe; IAN R. P. HESLOP, B.A., 34, Henleaze Gardens, Westbury-on-Trym, Bristol; HAROLD CECIL KENWAY, 179, Brook Street, Brooklyn, Pretoria; HERBERT ELLIS NORRIS, 15, Market Place, Cirencester, Gloucestershire; HUGH PARRY JONES, Natural History Museum, Wollaton Hall, Nottingham.

### *Proposed Changes in the Bye-Laws.*

The SECRETARY read for the third time the proposed changes in the Bye-Laws of the Society to be considered at a special meeting in April.

### *Exhibits.*

NOTES ON THE LARVAE OF *PAPILIO D. DARDANUS*, BROWN, IN UGANDA.—Prof. POULTON said his friends Mr. and Mrs. W. C. Simmons of Entebbe had made the following observations on the larvae and pupation of this most interesting butterfly.

“28 January, 1928: Entebbe.

“A captured female of the form *hippocoon*, F., laid globular, white, translucent eggs about 17 July 1928. Twelve were counted on July 23 when all produced larvae—black, replaced by white anteriorly and posteriorly, and bearing a double row of small spines, longer on the two white areas. The first change of skin was watched on July 31, when eleven larvae were found. They were now a shining and greenish-brown and white, like a bird's dropping on a leaf. The larvae rarely eat the leaf on which they have spun a silken patch as a foothold by day, but in early morning they walk across to another opposite leaf and feed ravenously for about half an hour, each then returning to its own leaf. [A drawing made on August 9 indicates that the foothold is spun on the upper surface of the leaf.] The resemblance in the early stages to a dark and white bird's dropping gradually changes at an ecdysis to a green colour shaded so as to make the larva appear one with the leaf. On being moved to fresh leaves the caterpillars, when fairly large, evert the bifid, dorsal, prothoracic gland which is brown in colour and emits a strong aromatic smell.

“August 22.—One larva started to pupate and on the following day another, while three were attached by the silken boss and girdle, awaiting pupation. The last stage of this process appears to be very violent, and involves much wriggling to force the skin through the girdle. One broke the silk and falling died immediately. Another with a deformed head died subsequently and dried up.

“From the five healthy pupae counted on Aug. 20, a male and a *cenea* female emerged Sept. 12 and three males on Sept. 13, 14, and 15, respectively.”

The behaviour of this caterpillar towards its foothold had not, Prof. Poulton believed, been previously recorded, and the falling of a pupa while the larval skin was being thrown off was a good example of the shock which, delivered at the precise moment which Dr. V. G. L. van Someren had shown to be critical, may probably explain the appearance of gynandromorphs in nature.

The first record of the life-history of *dardanus* was given by J. P. Mansel Weale,



quoted by Trimen in *South African Butterflies*, Vol. III, London, 1889, pp. 249-251. Certain points in the description of pupation had been shown to be mistaken by Dr. G. D. H. Carpenter (*Proc. Ent. Soc. Lond.*, 1913, pp. liii, liv), who had also given an excellent account of the resemblance to a bird's dropping and the change to a green colour which begins after the third ecdysis and is completed after the fourth (*ibid.*, pp. xxxiv, xxxv, lv, lvi).

A PHOTOGRAPH OF MALE PIERINE BUTTERFLIES *ITABALLIA D. DEMOPHILE*, L., CLUSTERED ON GROUND FROM WHICH LEAVES HAD BEEN REMOVED: MATTO GROSSO, BRAZIL.—The photograph exhibited by Prof. POULTON, was taken 28 April 1927, by Mr. C. L. Collenette at Urucum, Matto Grosso. In his interesting paper on the Bionomics of Brazilian Lepidoptera (*Trans. Ent. Soc. Lond.*, 1928, p. 404), Mr. Collenette stated that he had seen the males of this forest-haunting Pierine "on several occasions assembled in numbers on dead leaves which covered the ground under large trees." They also, as the photograph showed, clustered on the surface of the ground after the leaves had been removed, and Mr. Collenette thought that the attraction may possibly have been the juices of rotten fruit which remained soaking the ground after the fruit had disappeared.

NOTES ON BUTTERFLY MIGRATION IN EAST AFRICA.—Prof. POULTON communicated the following records recently received from friends in E. Africa.

(1) *Belenois mesentina*, Cram., at Dabida, Kenya Colony.—Four examples of *mesentina*, recently received from Canon K. St. Aubyn Rogers, were labelled as migrating at Dabida in 1927. One male was dated February 16, one female February 19, and a male and female March 7. The migration of this butterfly in Kenya Colony or Uganda had been recorded in five out of the last seven years (viz. 1922, 1924, 1926, 1927, and 1928). References to the first three of these were given in *Proc. Ent. Soc. Lond.*, III, 1928, p. 83, where an account of the 1928 migration was to be found.

(2) *Libythea laius*, Trim., in Nyasaland.—Dr. W. A. LAMBORN had written 12 February 1929 from Fort Johnston:—

"I did not see the migrating *Cymothoe caenis* in Nigeria. Rodney Wood writes to me, under date 4th January, from Magombwa Estate, P.O. Cholo, Nyasaland, that '*Libythea laius* are migrating eastwards to-day in thousands,' so I am writing to him that I am sure you would be glad of fuller details. They appear hereabouts quite suddenly, as *L. labdaca*, Westw., did on the West Coast, but I never learnt anything about them, never even saw one looking for a food-plant—and I have searched often and long enough." There were, however, certain observations which suggested that these two species of *Libythea* may seek some inorganic substance while on their migratory flight (*Proc. Ent. Soc. Lond.*, 1921, pp. lxii, lxiii).

AN AGERIID MOTH FROM JINJA, UGANDA, MIMICKING AN ICHNEUMONID.—Prof. POULTON exhibited a specimen of *Cryptomima hampsoni*, Butl., sent to him by his friend Dr. V. G. L. van Someren. This Ageriid was a beautiful mimic of *Oneinella analis*, Turn. and Waterst., an Ichneumonid parasite of Notodontid moths of the genus *Anaphe*. The Ageriid had been kindly determined by Mr. W. H. T. Tams.

A PREDACEOUS FLY *ASILUS* SP., WITH ITS PIERINE PREY, *ITABALLIA D. DEMOPHILE*, L., FROM MATTO GROSSO, BRAZIL.—Prof. POULTON exhibited a fine

female Asilid fly with its prey, a male forest-haunting Pierine, captured by his friend Mr. C. L. Collenette, 23 April 1927, at Urucum, Matto Grosso. Mr. Collenette had noted that "the Asilid took two longish flights, holding the butterfly beneath it, its wings parallel with the ground." The fly had been kindly determined by Mr. F. Barnett as a species of *Asilus*, very near *apicalis*, Walk.

BRITISH ASILID FLIES AND THEIR DIPTEROUS PREY.—Prof. POULTON exhibited the following interesting examples kindly given to him by his friend Mr. H. W. Andrews :—

*Neoitamus cyanurus*, Lw.—A female with Anthomyid prey, taken at Bexley, Kent, 11 June 1927. A male preying upon another male of the same species : Farningham, N. Kent, 3 July 1927. Mr. Andrews had noted that this last capture of a male by a male was quite unusual in his experience.

*Dioctria baumhaueri*, Mg.—A female with Empid prey, *Rhamphomyia* sp., ♀. Locality and date as in the last example.

A LONGICORN BEETLE WHICH IN ASHANTI IS BELIEVED TO PROMOTE HUMAN FERTILITY.—Prof. POULTON exhibited a specimen of *Ancyronotus tribulus*, F., a Lamiid Longicorn, from Aboaba, Obuasi, Ashanti. The specimen, which had been kindly named by Mr. K. G. Blair, was accompanied by the following statement of the native belief—"If this fly come for woman she catch piccin." This note was dated 4 November 1928 and had been sent with the beetle to the Pitt Rivers Department of the Oxford University Museum by Capt. R. P. Wild. "Piccin" clearly represented the well-known word "Piccaninny."

THE TABANID FLY *PANGONIA* (*NUCERIA*) *LONGIROSTRIS*, HARDWICKE, ATTACKING MAN AT NAINI TAL, CENTRAL HIMALAYAS.—Prof. POULTON exhibited 1♂, 4♀ of *Pangonia longirostris* collected by Mr. B. B. Osmaston at Naini Tal. His friend informed him that he had often been pierced by this fly, which frequented open places in the forest in the hot, damp weather of August. The attack, which was painful, was chiefly aimed at the legs, but sometimes other parts such as the hands or face.

Although Mitter's account of the blood-sucking habits of this species was detailed and precise (see p. 24), it was uncertain how far his description applied to the attacks upon man, said to be made "occasionally." Moreover, other keen naturalists had been unable to find any evidence that men or cattle were ever attacked. Thus the experience of Dr. A. D. Imms, quoted in H. Tetley's excellent paper on the feeding habits of *Pangonia longirostris* (*Bull. Ent. Res.*, VIII, 1918, pp. 253-267), was as follows—"They are found on the borders of forests towards the end of the rainy season, feeding on flowers of the orders Scrophulariaceæ and Labiatae by thrusting their proboscis into them, poisoning themselves in the air during the process. He has never seen them attacking man or cattle . . ." (p. 255).

It was therefore important to record all the details which Mr. Osmaston had been able to recall of this new evidence. He had kindly written as follows :—

"I am surprised that the fact that *Pangonia longirostris* bites man while it hovers is not well known. As a matter of fact I am *not* sure that it actually sucks blood while hovering. I distinctly remember that it *explores* for some time with its rostrum *on the wing*. When it finds a suitable place, *e.g.* on calf of leg under stocking,

the rostrum is bent on one side and the piercing mouth-parts, which are only about half an inch or less in length, are inserted.

I am sorry to say I do not remember for certain whether the fly actually inserts its piercing apparatus *on the wing*. It is *possible* that it alights first, or that it does so sometimes. The insect is found on the open grassy slopes of Cheena Mountain close to Naini Tal, at about 7000 to 8000 ft. altitude, and, so far as I remember, only early in August. I noticed these flies when I first visited Naini Tal in 1892-3 and again in 1908-9. I am not certain whether the specimens I gave you were collected on the first occasion or the second. I do not remember that the fly makes any sound when approaching in order to attack."

Tetley's paper, already referred to, gave a list of references to records of the habits of *Pangonia* in Africa and India, while others were quoted by J. L. Mitter in his interesting paper on the feeding habits of *Pangonia longirostris* (*Ind. Journ. Med. Res.*, Calcutta, V, 1917-18, p. 523). From his observations at Kasauli, the author stated that a female fly "will attack its host with a loud buzzing sound. . . . As it comes nearer its host, it detaches its labium from the true biting apparatus and makes sudden darts, thrusting with its piercing stylet. If the fly be not disturbed by the host it settles down, taking a firm hold of the skin with its claws. . . . If not disturbed it sucks blood for over four minutes" (p. 526). Such attacks were made upon "horses, cattle, and occasionally man," but the female was also a flower-feeder and the male exclusively so. The female "inflicts a severe bite on its host, and the moment it withdraws its proboscis several drops of blood are seen to ooze out of the wound. A swelling appears round the puncture within an hour, and the part remains painful for two or three days" (p. 527). At Kasauli the fly was on the wing from July to mid-September. Mitter considered that "observers who state that this fly sucks blood whilst hovering have perhaps observed only the preliminary process and not actually seen a fly in the act of feeding," when it "must take firm hold of the skin of the host in order to thrust its stylet through" (p. 527).

Bainbrigge Fletcher was also quoted in support of this conclusion (*Some South Indian Insects*, Govt. Press, Madras, 1914), whereas Patton and Cragg were of the opinion that some *Pangonias* feed on Mammalian blood without settling on the skin, but "while hovering near, by making sudden darts; to obtain a full meal it must be necessary for them to repeat the manoeuvre many times" (*Text-book of Medical Entomology*, London, 1913).

Although it was improbable, in view of the preceding evidence, that *Pangonia longirostris* sucks blood while hovering, it was certain that some of the African *Pangonias* do so, as recorded by W. J. Burchell in 1813 (*Proc. Ent. Soc. Lond.*, 1916, p. xc, where Westermann (1821) was also quoted), G. D. H. Carpenter in 1916 (*ibid.*, p. lxxxii, lxxxiii), and S. A. Neave in 1912 and 1915 (*Bull. Ent. Res.*, III, 1912, p. 283; V, 1914-15, p. 294). Schwetz had also stated that *Pangonia zonata*, Walk., and an allied species, sometimes suck blood, but not while hovering. His observations were made in the Belgian Congo, especially on the little river Kukwe. One of his natives said that the attack was like the prick of a needle and far more painful than that of a Tsetse (*Ann. Trop. Med. and Parasitology*, XII, 1918-19, p. 281).

Much help in obtaining references to the literature of the subject had been kindly given by Major E. E. Austen, D.S.O., and also yielded by the manuscript notes in the National Collection.



Brigadier T. D. BROUGHTON confirmed Mr. Osmaston's observations on *Pangonia longirostris* at Naini Tal, and gave the following account of his experience with this species.

"The insect is common on Cheena Peak near Naini Tal in the Kumaon Hills. It would appear to be local, as I have not noticed it at any other hill station, nor is it common on the other peaks round Naini Tal. Cheena Peak rises to about 8200 ft. and is the highest point in the district. The flies frequent paths and open spaces in the forest and are commonest from about 7000 ft. upwards. I have specimens taken on 16th Aug. and 1st Sept. They persistently attack human beings, pursuing for some distance with a loud humming noise, but do not follow into deep shade. I usually wore shorts and stockings, and they settled freely on the stockings, which they seemed to prefer to bare skin. I have never known them attack my face, hands or upper part of the body, and I did not notice that they bit on the wing. The bite is sharp, but not very painful, and so far as I was concerned there were no after effects. The flies also attack horses."

[After reading the manuscript of the above paragraph Mr. Osmaston wrote, 26 March 1929 :—"I was under the impression that the fly did *not* make a humming noise, but, as it is a good many years since I met it, and I am writing entirely from memory—having no notes on the subject—it is probable that the Brigadier is right. I have consulted my brother Mr. A. E. Osmaston and he says that he believes the fly makes a certain amount of noise when flying round but not when actually attacking."

Brigadier Broughton also wrote a few days after the meeting :—"I think the explanation is that *Pangonia* selects a suitable spot while hovering but usually, if not always, settles before actually biting. They certainly *do* settle sometimes. I have had as many as 5 or 6 settled on my legs at once, and was able to kill them with my hand. As regards noise, I certainly noticed a buzzing noise when the flies were following me; in fact, I thought I was being attacked by bees when I first came across the insect. No doubt, however, as Mr. Osmaston says, the fly is silent when actually attacking : on some occasions I have felt a sharp prick and on looking down have found several of the flies settled."]

Miss CYNTHIA LONGFIELD gave the following account of an attack by a flying Tabanid :—

"On a very hot day in July or August, about 1917, while I was weeding my rock-garden at Castle Mary, Cloyne, Co. Cork, Ireland, a gadfly (*Tabanus borinus*) flew at me. Hearing it coming, I straightened up and turned to face it. To my astonishment it made straight for my neck, and without waiting to settle, dug its proboscis in with great force. The blood spurted out, and I beat the fly off. I think I killed it, but can't quite remember. I have never been attacked so viciously before or since, although I have had many round me, and even resting on me. I do recollect that they were particularly plentiful that year, the cattle being nearly driven mad. My horse was twice bitten and badly scared, once nearly jumping a five-barred gate from a standstill while I was opening it. I think the fly did not settle on that occasion, but I can never forget its very fierce and sudden attack."

A NEW SUBSPECIES OF *ZEGRIS EUPHEME*, ESPER.—Captain A. F. HEMMING exhibited specimens of a new subspecies of *Zegris eupheme*, Esp., with specimens, for comparison, of the allied subspecies *Z. eupheme dyala*, Peile, and *Z. eupheme erothoë*, Ev., and communicated the following note :—

"In 1927 I received from Lt.-Col. F. W. Bewsher, D.S.O., O.B.E., M.C., a series of *Zegris eupheme*, Esp., taken by Mrs. Bewsher and himself at Shunit Nimrin in Transjordan and a few specimens taken at Jericho. In the same year I received from Captain L. K. Lockhart, M.B.E., M.C., R.A., a number of specimens taken at the same time, also for the most part at Shunit Nimrin. When this material was compared with that in the British Museum, it was apparent that *eupheme* from Transjordan and Palestine could not properly be referred to subspecies *dyala*, Peile (1921), under which the few specimens previously available had provisionally been

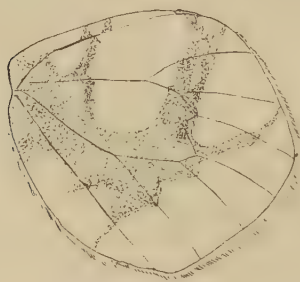


FIG. 1.—*Zegris eupheme dyala*, Peile.  
'Iraq. Kisil Robat. 400'.  
11.3.1919. H. D. Peile.  
♂ paratype.

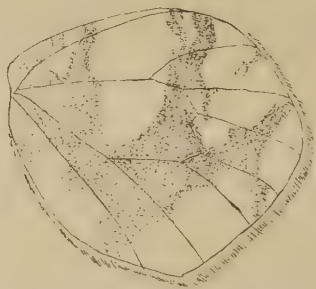


FIG. 2.—*Zegris eupheme uarda*, Hem.  
Transjordan. Shunit Nimrin.  
5.3.1927. U. Bewsher.  
♂ holotype.

placed. This subspecies, which I name after Mrs. Bewsher, by whom the greater part of the type material was collected, I describe as follows :—

***Zegris eupheme uarda*, sp. nov.** Text-fig. 2. Nearest to subspecies *dyala*, Peile, from which it differs as follows :—

"♂♀ *upperside*. Apical markings to fore-wings greyer and less blackish than in *dyala*, owing to presence, in larger quantities, of white scales mixed with the black ones; the reddish-orange patches longer and wider than in *dyala* and of a brighter tint; the black spot at the end of discoidal cell on fore-wings much broader and larger than in *dyala*.

"♂♀ *underside*. *Fore-wings*.—As on the upperside the black discoidal spot much larger than in *dyala* and usually sub-rectangular (semi-lunar in *dyala*). *Hind-wings*.—The yellowish-green mottling much heavier than *dyala*, from which it further differs by the presence, in the discal region, in most specimens of orange-yellow scales at the junction of the mottled and white areas. In *dyala*, almost invariably, the outer margin of the mottled area describes a practically straight line, the remaining area of the wing (about one-third of the whole) being pure white (text-fig. 1). In *uarda*, there is in the latter area an extension of the mottling, an arm of which reaches the distal margin of the wing (text-fig. 2).

"*Average length of fore-wing* : ♂ 25 mm., ♀ 28 mm.

"♂ holotype. 'Transjordan, Shunit Nimrin, 5.3.1927, U. Bewsher' (A. F. Hemming Coll. No. 24896).

"♀ allotype. 'Transjordan, Shunit Nimrin, 3.3.1927, U. Bewsher' (A. F. Hemming Coll. No. 24893).

"Paratypes in Hemming and Bewsher Colls. and in British Museum (B.M. Types No. Rh. 353-7 ♂, 358 ♀).

"*Habitat*: TRANSJORDAN:—Shunit Nimrin and the foot-hills to the east of it (400 ft. or more below sea-level); Wadi Musa, below El Gee; Petra.

"PALESTINE:—*Jordan Valley*: Jericho and neighbourhood. *Southern Steppe Region*: Near Asluj, 25 miles south of Beersheba.

"There are specimens from all the foregoing localities in the Hemming Coll., except Petra, from which locality there are ♂ 4, ♀ 1 in the British Museum, taken by Philby, 19.3.-1.4.1923. The Asluj specimen, a ♂, taken by Captain Lockhart, 8.3.1923, is of particular interest, as *eupheme* had not previously been taken in Palestine outside the Jordan Valley.

"It is now possible to summarise the geographical distribution of the species as follows:—

" *Zegris eupheme*, Esp.

(a) *ssp. meridionalis*, Led.

*Anthocaris eupheme* var. *meridionalis*, Lederer, Verh. z.-b. Ver. Wien, ii, pp. 18, 30: 1852. 'Andalusia.'

"This subspecies was named by reference to the Andalusian specimens figured and described under the name *eupheme* by Rambur in 1840 (*Faun. And.*, p. 247, pl. II, figs. 1, 2 ♂, 3 ♀). In Spain it occurs in Aragon (Albarracin, Bronchales), Castile (Madrid, from which locality it was sent to Rambur by Graells), Andalusia (Grenada, Sierra d'Alfakar) and Malaga (Ronda, Malaga).

In 1920, Lucas recorded (*Bull. Soc. ent. France*, 1920, p. 254) the occurrence of *meridionalis* in Morocco at Meknès, 1800 m. Lord Rothschild has recorded (*Bull. Soc. Sci. Nat. Maroc*, v, p. 326, 1926) the capture, by Hartert and Young, of ♂ 3, ♀ 1 *meridionalis* in the Middle Atlas (Tarseft Pass, 2200 m.) in June 1925.

(b) *ssp. eupheme*, Esp.

*Papilio* (*Dan. cand.*) *eupheme*, Esp., Schmett. Eur., i, (Fortsetz), p. 105, pl. 113, figs. 2, 3 ♂: 1805. 'Sewastopol.'

"Alpheraky carefully worked out (*Oberthur's Ét. Lép. Comp.*, vii, pp. 221-3, 227-9: 1913) the distribution of nominotypical *eupheme*, which he gives as follows: 'Coast to the north of the Black Sea and the Sea of Azov, as far as Odessa to the west and the river Don to the east; Governments of Ekaterinoslav and Kharkof, as far north as the town of Kharkof (where it appears to be very rare); Lower Volga from Sarepta to Ouralsk.' He also refers to a note by Krenjopolsky, who had a pair of *eupheme* labelled 'Uman, gouv Kief, Mai.'

(c) *ssp. erothoë*, Eversmann.

*Pontia erothoë*, Ev., Nouv. Mém. Soc. Nat. Mosc., ii, p. 351, pl. 20, figs. 1, 2: 1830. '*In monticulis Tschaptschatschi deserti australioris inter Rhymnum et Wolgam.*' *Anthocaris eupheme* var. *tschudica*, H.-S., Schmett. Eur., i, figs. 449, 450 ♂ (1850), vi, p. 20 (1851).

"Eversmann's types came, as stated above, from the steppe country lying between the lower Volga and the Ural. Alpheraky (*l.c.* 1913) figures a specimen taken further east at the mouth of the Emba (Pl. 194, fig. A ♂) and another from Ouralsk (Pl. 194, fig. B ♂). In the Hemming Coll. the localities



represented are as follows :—Astrachan ♂, ♀; Uralsk, ♂, 28.5.1907; ♀, 6.6.1907 (*Max Bartel*).

“Herrich-Schaeffer’s *tschudica* has always been a source of difficulty, largely because his specimen, a male ‘received from Herr Keferstein,’ was without any indication of locality. Eversmann’s *erothoë* was unfortunately treated as a synonym of *eupheme* for over eighty years until it was revived by Alpheraky (1913). Till then *tschudica* had been frequently used to describe what was really *erothoë*, e.g. by Röber (Seitz, i, pl. 23, fig. A, 7 ♂). In the British Museum Coll., Mr. H. T. G. Watkins has suggested that *tschudica* may have been named from specimens from Tschudia which he has identified as being in the Volga region. *Tschudica* is therefore either a synonym of *erothoë*, Ev., or a lightly marked individual form of nominotypical *eupheme*, probably the former.

(d) *ssp. dyala*, Peile.

*Zegris eupheme dyala*, Peile, Entom., liv, p. 151, 1921; Riley, Ann. Mag. Nat. Hist., (9) viii, p. 591, 1921; Peile, Journ. Bombay N.H.S., xxviii, pp. 354–5, pl. figs. 1, ♂, 2 ♀: 1922. ‘Mesopotamia, Kizil Robat, L. bank of R. Dyala’ (Riley, 1921).

“In the British Museum there are ♂ 27, ♀ 27 of Col. Peile’s type material from Kizil Robat on the left bank of the River Dyala in ‘Iraq. The ♂ holotype is labelled ‘24.3.1919’ and the ♀ allotype ‘16.3.1919.’ The extent and pattern of the mottling on the underside of the hind-wing are the features by which *dyala* can be most readily separated from the following subspecies (text-fig. 1). In the same collection, there are ♂ 6, ♀ 4 of *dyala* from South West Persia, labelled ‘Maidan-Napthun, March-April 1925, J. P. de Verteuil.’ As pointed out by Riley (1912), the specimen recorded by Le Cerf (*Ann. d’Hist. Nat. Ent.*, ii, p. 29, 1913) as *tschudica* from Danah-Kouh in Persia is probably also referable to *dyala*. Alpheraky’s figure of *tschudica* from ‘Perse, Arabistan’ (in Oberthur’s *Ét. Lép. Comp.*, vii, pl. 194, fig. C ♂) is certainly *dyala*.

(e) *ssp. uarda*, Hemming.

“Only known at present from Transjordan and Palestine. The details of its known localities have been given above.

(f) *ssp. tigris*, Riley.

*Zegris eupheme tigris*, Riley, Ann. Mag. Nat. Hist., (9) viii, p. 591: 1921. ‘Mesopotamia, Fathah, R. bank R. Tigris.’

“Described from ♂ 13, ♀ 4 taken by Col. Peile in 1920 (♂ holotype March 25, ♀ allotype March 30). *Tigris* can, at once, be separated from *dyala*, to which in other respects it is very close, by the bright yellow apical patches to the fore-wings. The same character among others separates it from *uarda* and *erothoë*.

“In 1927 Captain Lockhart found *tigris* in Northern Transjordan. The specimens, now in the Hemming Coll., are labelled as follows :—‘Sukhni, north of Zerqa,’ 27.3.1927, ♂ 2, and 3.4.1927, ♂ 1, ♀ 1; ‘Desert 25 miles east of Zerqa,’ 11.4.1927, ♀ 2 (worn).

(g) *ssp. menestho*, Ménétrières.

*Pieris menestho*, Mén., Cat. Rais., p. 245: 1832. ‘Zouvant, sur les montagnes de Talyche.’ *Zegris eupheme* var. *menestho* id., Enum. Corp. An. Mus. Petrop., p. 75: 1855. Alpheraky, in Oberthur’s *Ét. Lép. Comp.* vii, pp. 226–7, 230, pl. 194, fig. 9♂: 1913.

“Alpheraky gives a good figure of Ménétrières’ type, preserved in the collection of the Zoological Museum of Saint-Petersbourg. It was taken in the Caucasus in the

'montagnes de Talyche.' In the British Museum, there are specimens of *menestho* from the following localities :—Caucasus; Amasia; Smyrna (almost certainly a mistake in labelling); Ordubad, ♂ 14.5.1883, ♀ 31.5.1883 (*Christoph*); Tokat, 1906, ♂ 1 *ex* Oberthur Coll.; Syrie, Akbès, 1900, ♀ 1, *ex* Oberthur Coll.; Shar Deresy, N. Syria, native collectors 1890, ♂ 3, ♀ 1, *ex* Leech and Elwes Colls. It is also recorded from Safâh in Syria by Calberta (*Iris*, iv, p. 39.; 1891). These Syrian records are of interest as showing that *menestho* approaches to within 200 or 300 miles of the region inhabited by the very different subspecies *uarda*.

"In the Hemming Coll., *menestho* is represented from the following additional localities :—Mersivan; Malatia; Kars, Prokhladnoye, 20.6.1920; Baku, Mai 8; Achal-Tekke (*Tancré*).

(*h*) ssp. *sulphurea*, Bang-Haas.

*Zegris eupheme sulphurea*, Bang-Haas, Horae Macrolep., i, p. 40, pl. 6, fig. 7 ♀ : 1927. 'Thianchan Sept. Kuldscha, Ili Gebiet.'

"In his original description Bang-Haas distinguishes *sulphurea* from Russian specimens of *eupheme* by the bright citron yellow suffusion of the hind-wings on the upperside. In the Hemming Coll., there are ♂♀ paratypes received from Dr. Bang-Haas, labelled 'Kouldja, 1880, *Tancré*' and a male labelled 'Lepsa, *Haberhauer*.' The latter is one of the four specimens taken in 1877 recorded by Staudinger (*Stett. Ent. Zeit.*, xlii, p. 279 : 1881). In the British Museum there are two males which appear to be referable to *sulphurea*. One from the Leech Coll. is simply labelled 'Persia,' the other is labelled 'Helenensdorf, *ex* Coll. Christoph.' Finally in the Hemming Coll., there are ♂ 1, ♀ 1 labelled 'Uralka, Gv. Orenburg, Juli, 315 m.' and ♀ 1 labelled 'Orenburg, *J. Tief, ex* coll. Bartel.' All these specimens agree not only in the presence of the character indicated by Dr. Bang-Haas, but also in the sharply defined black and red apical markings to the fore-wings on the upperside, the extension, and darker colour, of the mottled area on the underside of the hind-wings and the invasion of the white spaces on that surface of the hind-wings with bright yellow scales."

Wednesday, April 3rd, 1929.

#### *Special Meeting.*

Dr. K. JORDAN, President, in the Chair.

The resolution of the Council summoning the Special Meeting having been read by the Secretary, the following resolution was proposed from the Chair and passed unanimously :—

"That the changes in the Bye-Laws approved at this meeting do take effect as from the date of the appointment of the first holder of the office of Registrar."

The following suggested alterations in each Chapter were then put separately before the meeting from the Chair :—

## CHAPTER III.

§ 1. Substitute "fourteen" for "twelve."

At end insert new § 2. The Council shall have power to appoint Committees to assist them in the discharge of particular aspects of their duties, and may delegate to such Committees, which may consist, in part, of Fellows of the Society who are not members of the Council, such power or powers as the Council in their absolute discretion may think fit.

## CHAPTER IV.

Line 2. Delete the words "two Secretaries and a Librarian" and insert the words "and a Secretary."

*New* CHAPTER V.*Officials.*

§ 1. The Council shall have power to appoint a permanent Officer, to be styled Registrar, who shall not be a Fellow of the Society or, if a Fellow, shall vacate his Fellowship on appointment to the said office and shall be ineligible for re-election for so long as he may continue to be so employed. The Council in whom the power of appointing or removing the Registrar shall be vested, shall have power to determine from time to time the rate or rates of remuneration of that official.

§ 2. In addition, the Council may at any time employ a Sub-Librarian or other official, or a caretaker or other employee, who shall not be a Fellow of the Society, and any official or other person so employed shall receive such remuneration as the Council may from time to time determine, and shall be subject to such Rules or Orders as the Council, through its officers, may from time to time direct.

*Chapters V, VI and VII to become Chapters VI, VII and VIII.*

CHAPTER IX (*Old Chapter VIII*). *Treasurer.*

*Delete existing Chapter and substitute the following :—*

§ 1. The duties of the Treasurer shall be as set out in the following sections :

§ 2. The Treasurer shall be responsible for demanding and receiving for the use of the Society all sums of money due, or payable, to the Society, and for directing the due disbursement by the Registrar of all moneys payable by the Society out of the funds in his hands.

§ 3. It shall further be the duty of the Treasurer to exercise general superintendence over the Registrar in respect of the financial duties of that official as hereinafter defined in Chapter XI, Sections 2 to 6, of these Bye-Laws.

§ 4. No payment exceeding £10 shall be authorised by the Treasurer unless the previous consent of the Council or of a Finance Committee appointed by it has been obtained.

§ 5. All cheques drawn on the Society's bank in payment of the Society's obligations shall be signed by the Registrar and countersigned by the Treasurer, who shall be jointly and severally responsible that such payments have been authorised in accordance with Section 4 above.

At a convenient date towards the close of each year the Treasurer shall cause



to be prepared by the Registrar a Statement of the Society's financial affairs for submission to the Auditor appointed by the Council as hereinafter provided, to whom he shall furnish all the facilities that the Auditor may demand for the auditing of the accounts.

§ 6. The Treasurer shall each year sign the accounts and shall submit them when audited to the Council; and at the Annual Meeting, as hereinafter provided, shall submit to the Society his Report for the year and the Statement of the Society's financial affairs.

§ 7. In the absence of the Registrar through ill-health or for any other cause, or during any vacancy of the office of Registrar, the Treasurer shall be responsible for the due performance of the financial duties assigned to the Registrar in Chapter XI, Sections 2 to 6, of these Bye-Laws.

§ 8. The Council shall nominate every year a Chartered or Incorporated Accountant who shall audit the Treasurer's accounts for that year. The Council shall have authority to pay the Auditor each year a fee of such amount as in their discretion they may from time to time determine.

The following amendment was moved from the Chair respecting Section 5, line 2, *viz.* that the words "Registrar and countersigned by the" be deleted, that after the word "Treasurer" "or in his absence, by such other Fellow as the Council may appoint" be inserted, and that in line 3 the words "jointly and severally" be deleted.

It was also proposed from the Chair that in Section 4, line 1, the words "made or" shall be inserted before "authorised." These amendments were approved, and it was agreed that these Sections should read as follows :—

4. No payment exceeding £10 shall be made or authorised by the Treasurer unless the previous consent of the Council or of a Finance Committee appointed by it has been obtained.
5. All cheques drawn on the Society's bank in payment of the Society's obligations shall be signed by the Treasurer, or in his absence, by such other Fellow as the Council may appoint, who shall be responsible that such payments have been authorised in accordance with Section 4 above.

#### *New CHAPTER X. Secretary.*

*Delete Chapter IX and substitute the following :—*

§ 1. The duties of the Secretary shall be as set out in the following sections :

§ 2. It shall be the duty of the Secretary to exercise general supervision over the Registrar in respect of the duties of that official as defined in Chapter XI, Sections 7 to 9, of these Bye-Laws.

§ 3. The Secretary shall be responsible to the Council for the proper conduct of all correspondence (other than financial) on behalf of the Society, but he shall have authority to delegate to the Registrar the conduct under his directions of particular classes of correspondence.

§ 4. The Secretary shall present to the Council and to its Committees the minutes prepared under his direction by the Registrar; and shall also present to the Society the minutes similarly prepared of its Meetings.

§ 5. The Secretary shall act as Editor of the Society's Publications.

§ 6. In the absence of the Registrar through ill-health or for any other cause, or during any vacancy in the office of Registrar, the Secretary shall be responsible for the due performance of the duties assigned to the Registrar in Chapter XI, Sections 7 to 9, of these Bye-Laws.

§ 7. In the absence of the Secretary from any Meeting of the Society, or of the Council, the Chairman of such Meeting shall appoint a Fellow to perform the duties assigned to the Secretary in Section 4 above.

#### *New CHAPTER XI. Registrar.*

*Delete Chapter X, " Librarian," and substitute a new Chapter entitled "Registrar" as follows :—*

§ 1. The duties of the Registrar shall be as set out in the following sections :

#### *Financial Duties.*

§ 2. Subject to the general direction of the Treasurer, it shall be the duty of the Registrar to keep books of Cheque receipts for Admission Fees, Annual Payments and any other necessary purposes, to sign each such receipt and to add in every case on both the receipt and the counterfoil the name of the Fellow or other person paying and the date on which the payment is made; and to make such payments on behalf of the Society as the Treasurer may direct in accordance with the provisions of Chapter IX, Section 4, of these Bye-Laws.

§ 3. All cheques drawn on the Society's bank in payment of the Society's obligations shall be prepared and signed by the Registrar, who shall submit them to the Treasurer for counter-signature.

§ 4. The Registrar shall demand all arrears of payment of the annual subscriptions of Fellows after such payment shall have been due two calendar months.

§ 5. The Registrar shall each year prepare for submission to the Treasurer a Statement of the Society's financial affairs for submission to the Auditor appointed by the Council, and shall assist the Treasurer in furnishing the Auditor with all particulars that he may require.

§ 6. The Registrar shall act under the direction of the Treasurer in connection with the sale of the Society's Publications, and generally in regard to matters affecting the financial affairs of the Society.

It was proposed from the Chair that the whole of Section 3 be deleted. This was approved, and it was pointed out that this would involve re-numbering the Sections of the Chapter.

#### *Secretarial Duties.*

§ 7. Subject to the general direction of the Secretary, it shall be the duty of the Registrar to keep a list of all Fellows of the Society, together with their last known addresses; to summon Meetings of the Society, and of the Council and its Committees, when directed to do so by the Secretary; to conduct such correspondence connected with the Society as the Secretary or the Treasurer in financial matters may direct; to prepare for submission to the Secretary the Minutes of the

Proceedings at the Meetings of the Society and the Council; to act as Sub-Editor of the Society's Publications; and generally to act under the direction of the Secretary in all matters (other than as provided in Sections 2 to 6 above) affecting the welfare of the Society.

### *Library Duties.*

§ 8. Subject to the general direction of the Secretary, it shall be the duty of the Registrar to superintend the use of the Library; to take care of all books and manuscripts belonging to the Society; to maintain the Catalogue thereof, with the names of the Donors in the case of books or MSS. presented to the Society; to recall in accordance with the Library Regulations all books borrowed by the Fellows; and generally to see that the Regulations affecting the Library and its use are observed.

§ 9. It shall further be the duty of the Registrar under the general direction of the Secretary to prepare from time to time for the consideration of the Council (or of any Committee appointed by the Council for the purpose), lists of books and periodicals not in the possession of the Society for purchase by the Council; and he shall be responsible for the due execution of any directions in regard thereto that may be given to him by the Council or by such Committee appointed by the Council.

*Old Chapters XI et seq. to be numbered XII, etc.*

### CHAPTER XIII (*Old Chapter XII*).

§ 1. Line 3. Substitute "and Secretary" for "Secretaries and Librarian," and, line 6, substitute "fourteen" for "twelve."

§ 5. Line 5. Substitute "Secretary" for "Secretaries."

### CHAPTER XV (*Old Chapter XIV*).

§ 2. Line 7. Substitute "Publications" for "Transactions."

Delete Section 3 and substitute the following:—

§ 3. Every Fellow shall pay the Annual Contribution of two guineas except:

(a) Those Fellows who have compounded, and

(b) Such Fellows who, having been elected before January 1st, 1921, shall have given notice in writing to the Treasurer, not later than the date fixed for these Bye-Laws to come into operation, that they do not desire to receive the Transactions of the Society, in which case their Annual Contribution shall be one guinea.

### CHAPTER XVII (*Old Chapter XVI*).

§ 1. At beginning insert the following words, "subject to the provisions of Section 2 of this Chapter."

After § 1 insert new Section 2 as follows:—

"Fellows who have failed to pay their annual contribution by July 1st shall not be entitled to the enjoyment of any of the privileges set out in the foregoing section until such contribution shall have been paid."

Existing Sections 2 and 3 to be numbered 3 and 4 respectively.



CHAPTER XXI (*Old Chapter XX*).

§ 2. Delete subsection (1) and renumber remaining subsections (2 to 8) 1 to 7.

Line 5. Delete the words "one of."

Line 6. Substitute "Secretary" for "Secretaries."

Line 14. Delete the words "one of."

Line 15. Substitute the word "Secretary" for "Secretaries."

CHAPTER XXIV (*Old Chapter XXIII*).

§ 4. Line 2. Substitute the word "Titles" for the word "Abstracts."

Lines 3 and 4. Delete the last sentence ("The Proceedings . . . Transactions").

CHAPTER XXV (*Old Chapter XXIV*).

§ 2. Line 2. Substitute "Proceedings" for "Transactions."

It was then proposed by Professor E. B. POULTON, F.R.S., and seconded by Mr. G. T. BETHUNE-BAKER that the Bye-Laws as amended at this meeting be the Bye-Laws of the Society, and this was carried unanimously.

Wednesday, April 3rd, 1929.

Dr. K. JORDAN, President, in the Chair.

*Obituary.*

The PRESIDENT announced the death of the Rev. A. E. EATON, M.A., a Fellow of the Society.

*Election of Fellows.*

The following were elected Fellows of the Society:—Dr. WALTHER HORN, 20, Gossler Strasse, Berlin-Dahlem, Germany, and P. G. SHUTE, Malaria Laboratory, Ministry of Health, Whitehall.

*Exhibits.*

ON A BRAZILIAN SAND-FLEA, *TUNGA CAECATA*, ENDERL. 1901.—The PRESIDENT exhibited three specimens of the common house-mouse (*Mus musculus*, L., a cosmopolitan species) behind the ears of which there were clusters of two or three swellings the size of a pea, each swelling containing the extended female of *Tunga caecata*. The name *Tunga* is a late introduction. The genus was first called *Dermatophylus* by Lucas in 1839, based on *Pulex penetrans*, L. 1758. In 1840 Westwood named it *Sarcophaga*, but finding this name preoccupied in Diptera replaced it by *Sarcopsylla*. In 1844 Guérin accepted Lucas's name in the amended form *Dermatophilus*, which Jordan and Rothschild adopted in their Revision of the SARCOPSYLLIDAE in 1906. But that was not final, the President continued, for Durrant discovered a Polish book by Jarocki bearing the year 1838 in which the genus *Tunga* is erected for *Pulex penetrans*, L. Will this be final? A proposal has been made (unofficially) that from a certain future date no further "discoveries" of this kind should affect nomen-

clature. It might be advisable to adopt some such rule. The introduction of *Tunga* also raises the question of the family name for these fleas. In the above-mentioned Revision SARCOPSYLLIDAE was retained, although *Dermatophylus* had priority over *Sarcopsylla*. The British National Committee on Entomological Nomenclature is of opinion that no change of family name is necessary in such cases. The point is now before the International Commission on Zoological Nomenclature. *Tunga caecata* is evidently confined to South-east Brazil, whereas *T. penetrans* is now abundant in the tropical and subtropical districts of America and Africa. In China a third species occurs: *T. caecigena*, J. & R. 1921. It is interesting to note the difference of location on the host, *T. penetrans* attacking the lower extremities of all kinds of animals, particularly the feet, and *T. caecata* (as well as *T. caecigena*) settle behind the ears of rats and mice.

THE RESTING ATTITUDE OF *LITHOPHANE SEMIBRUNNEA*.—Mr. H. M. EDELSTEN exhibited a specimen of *Lithophane semibrunnea*, Hw., in the position in which it had hibernated on a sprig of ivy. It had died during the winter, probably having been killed by the cold weather.

BIRDS AS THE ENEMIES OF BUTTERFLIES.—Prof. POULTON said that for many years he had made a point of collecting observations bearing on this interesting and important subject, and had recorded several of these in our *Proceedings*. Although he was in general agreement with the following opinion expressed by his friend Dr. G. A. K. Marshall, C.M.G., F.R.S., in his admirable paper (*Trans. Ent. Soc. Lond.*, 1909, p. 329):—"The publication of isolated cases is of little value; the evidence to carry weight must be in bulk" (p. 383)—, yet he believed that even single examples may sometimes be of considerable importance, like the rejection of *Danaida chrysippus* after being seized, as described in our *Proceedings* for 1921, p. lxxiv. Furthermore, publication from time to time instead of waiting for evidence in bulk, was likely to stimulate observation, while the accumulated records were easily brought together if concentrated in a single channel as so many of them were in our *Proceedings* and *Transactions*. The following six communications bore upon this subject either by recording the general impressions of naturalists or the observations of actual attacks made by birds.

AN IMPRESSION THAT BIRDS ARE NOT SERIOUS ENEMIES OF BUTTERFLIES.—Prof. POULTON communicated the following extract from a letter written to him, 20 February 1918, from Durban, by his friend Mr. C. N. Barker.

"Prof. Punnett's book on Mimicry in Butterflies I had the loan of from a friend, and read it some 18 months or 2 years ago. Its principal value to me was its endorsement, on data brought up to date of publication, 1915, of my contention as to the insufficient evidence in favour of the discriminating attacks of birds on butterflies. It is a curious coincidence that the copy of the book, which I borrowed, has the following written in pencil under page 140. 'During the last 10 years of continuous fieldwork I have not observed a *single butterfly* attacked by *birds*, and in many hundreds of bird skins obtained for the various S.A. Museums (Transvaal

chiefly) not *one* contained butterfly remains in crop.' Signed H. H. Swinny. I have discussed the same subject with so many field observers interested in Ornithological and Entomological lines, and their verdicts have been unfailingly against the assumption of the systematic persecution of butterflies by birds.

"I am sending herewith a *Salamis anacardii*, L., which I came across last December in the Stella Bush. It was fluttering in some herbage near the ground. It had been evidently injured immediately before I came across it, as the clean cut through the costa was fresh and exuding. The injury is so close to the vital parts, head and thorax, as to make it remarkable that it escaped its enemy. Whether it had been snipped by a bird when on the wing or seized by the claw of a mantis it would be difficult to say. That it got clear with such an injury, if effected by a bird, is very remarkable. You have some remarks in *Proc. Ent. Soc. Lond.*, 1913, pp. xix-xxii, in which you refer to disabling injuries of *unpalatable* Lepidoptera, which had been nevertheless rejected. This might afford an interesting parallel case, were it not that *S. anacardii* is not classed among the unpalatable species."

[The specimen referred to did not reach me, having been probably lost in the post. Dr. Longstaff wrote concerning *anacardii*—"both sexes have an animal-like odour, suggesting to me rabbit-hutches; it appears to be stronger in the female" (*Butterfly-Hunting*, London, 1912, p. 502). It is now known that a butterfly, after being swallowed by a bird, is quickly reduced to fragments unrecognisable except by the aid of a compound microscope (*Proc. Ent. Soc. Lond.*, 1915, p. xxxix; 1920, p. xxvi).—E. B. P.]

THE INFLUENCE OF WET AND DRY SEASONS AND OF DESERT CONDITIONS UPON THE STRUGGLE FOR EXISTENCE IN BUTTERFLIES.—Prof. POULTON communicated a letter, written 29 June 1922, from his familiar address, "Army and Navy Club," by their old friend and Fellow, the late Col. J. W. Yerbury. It was of much interest to record the memories and impressions of such a keen and experienced naturalist, although he could not agree with the inferences, believing that the differences were to be explained by the greater severity of the struggle and the more complete reliance upon cryptic coloration and behaviour in the Dry Season as compared with the Wet, and especially in the nearly perennial Dry Season of the desert. If birds were less in evidence in desert areas, they were still there, and among them numbers of insectivorous species; but they, as well as their insect-prey—except the black, slow-moving forms belonging to specially protected groups—were rendered inconspicuous by a Procryptic coloration.

"Thanks for the pamphlet; it gives me an opportunity of drawing attention to a fault you share with Carpenter in ignoring the fact that 'circumstances alter cases,' and à propos of this idea to refer to p. 29, last three lines,\* and to an old debating ground of ours. I have formed the following opinion:—

\* The three lines referred to, italicised in the following quotation, are included in a paragraph on "Mimetic Resemblance and the Struggle for Existence" (*Trans. S.E. Union of Sci. Societies*, 1921, p. 29):—"Both theories [of Bates and Müller] stand or fall by the value in the struggle for life of the resemblances they were framed to interpret. And, although it is steadily accumulating, we have far too little evidence of such value in the struggle. *There are, indeed, naturalists who maintain that the attacks of birds upon butterflies are negligible, and yet discriminating attacks by these very enemies are essential to both theories.*"



" i. In countries of heavy rainfall, *e.g.* Ceylon and ? Victoria Nyanza, the capture of butterflies by birds is a common occurrence.

" ii. Where the fall is moderate, if on the high side, *e.g.* Thundiani, the occurrence is occasionally seen. When the fall is on the low side, *e.g.* Mhow or Poonah, if seen at all it is rarely met with.

" iii. In desert regions, *e.g.* Aden, Nasirabad, it is never seen.

" From this it follows that Carpenter and others at Victoria Nyanza, on the look-out for this occurrence, should meet with it often, whereas Yerbury at Aden or Hyderabad (Sind), likewise on the *qui vive*, might observe until the crack of doom without meeting with an instance. As a matter of fact, birds are not in evidence in desert districts, and probably the enemies of butterflies there are almost entirely invertebrate."

ATTACKS BY BIRDS UPON BUTTERFLIES RECORDED IN AN INDIAN FIELD DIARY.—  
Prof. POULTON communicated the following interesting record of observations forwarded from Kenya Colony by Major K. A. C. Doig, R.A.M.C. :—

" *Karundas Estate, P.O. Nyeri : 2 Oct., 1928.*

" I am forwarding herewith certain extracts from my Indian Field Diary, which I think may be of interest to some of the Fellows. After ten years' collecting and studying both butterflies and birds in India from sea-level to 17,000 feet elevation in the Himalaya, these are the only cases in which I have seen butterflies taken by birds, and these seem to me rather remarkable ! "

*Mainpuri, U.P. : 18 October 1909.*—When out with the net this morning I came across a number of *Charaxes fabius*, F., flying round a parasitic plant on an old mango stump at the edge of a large mango grove. I watched them for a few moments and detected a female sitting on a leaf about 20 feet from the ground, the butterflies I had first noticed being evidently males. I had been watching them flying round in large circles, fighting with each other for a moment or two, but always returning to flutter round the female again, when suddenly a Shrike, *Lanius erythronotus*, Vigors (Rufous-backed Shrike), I think, flew from a near tree and seized one of the males as he was fluttering round the female. The Shrike flew back with the prize to his original perch, held the butterfly with his foot, nipped off the wings and rapidly swallowed the remainder of the insect. Remaining perfectly still I saw this procedure repeated, but a third effort on the Shrike's part failed. This seemed to discourage him, as he flew to another perch about 50 yards away. I managed to capture the female *fabius* and one of the males. This butterfly is remarkably strong on the wing and very wide awake, and one would think would be very rarely taken by a bird.

*Shahjahanpur, U.P. : 23 February 1910.*—To-day after setting some dozen butterflies I placed them on my window-ledge in the sun, so that they might dry quickly. On the board were 2 *Pyrameis cardui*, L., 4 *Colias fieldi*, Mén., 2 *Delias eucharis*, Drury, 2 *Pieris brassicae*, L., 1 *Papilio polytes*, L., *romulus*, Cr., ♀, 1 *P. demoleus*, L. I then went away for about a quarter of an hour, and, on returning to look at the butterflies, found a pair of House-sparrows busily engaged in pulling the

insects off the boards; in fact they had almost finished their meal, as on examining the boards only one *D. eucharis* was intact. Every other insect had had the body eaten, even the thorax being pulled off the pin.

*Chakrata, W. Himalaya : 14 May 1914.*—I was much interested in an Indian Ashy Drongo (*Dicurus longicaudatus*, A. Hay), this morning. He was perched on the top of a low shrub growing on a steep grassy hill-side close to my house. I watched him for half an hour, during which time he captured five moths, very like our English *Plusia gamma*, L., and numerous grasshoppers. What interested me most was the fact that he paid no attention to the butterflies, chiefly *Colias fieldi*, *C. hyale*, L., *Papilio machaon*, L., *Aporia soracte*, Moore, *A. phryxe*, Boisd., *Pieris canidia*, Sparrm., all of which, with several LYCAENIDAE, were present in large numbers and settling on flowers within a yard or two of him; but the moment a "Silver-Y" buzzed out of the grass, or a grasshopper jumped, he was on to it immediately, and only missed one moth during the time I watched him. Are all these butterflies protected?

*Chakrata, W. Himalaya : 8 May 1914.*—A very severe hailstorm came on about one o'clock to-day, and lasted 35 minutes. I went out along a woodland path after it was over, and was much struck by the large number of butterflies lying on the ground beaten to death by the hailstones. Along 400 yards of this path I counted 32 *Aporia soracte*, 19 *A. caphusa*, Moore, 6 *Pieris canidia* and 2 *Papilio govindra*, Moore. In previous years in the hills I have noticed very much the same thing happen; *Aporias* seem always to suffer the heaviest casualties owing to the habit of slowly flying round the trees and bushes that do not afford much shelter; but on other occasions I have noticed a good many *Erebias* and LYCAENIDAE. In spite of this heavy mortality *A. soracte* and *A. caphusa* are exceedingly abundant year after year in all the hill stations of the N.W. Himalaya. During these heavy hailstorms which occur annually in these parts, hundreds of thousands of butterflies must be destroyed: in fact, I am of the opinion that the great majority of butterflies, such as *Aporia* and *Delias* which at Chakrata swarm until the monsoon breaks, and roost on trees, are killed during the first fortnight of the rains. During the short breaks one sees them on the wing looking more and more worn, until after a particularly heavy shower no more are seen till the next spring. In years when the monsoon is late or weak they continue on the wing, right up to mid-July. It is quite apparent that climate must exercise a far greater check to these species than birds or other rapacious beasts. During seven years' collecting in the Himalayas I have only seen one butterfly taken by a bird, and this was *Erebia kalinda*, Moore, taken by a Pipit. On another occasion I saw a lizard bite out a large piece of the hind-wings of *Mycalesis polydecta*, Cram., but the insect escaped and is now in my collection!

*Nasirabad, Rajputana : 7 September 1917.*—I was out shooting "Rain Quail" this morning near the Dain river. During a heavy shower I took shelter in a thick grove of thorny *Acacia*. On looking up I noticed some *Papilio aristolochiae*, F., sitting on the flowers, with closed wings. The storm lasted about 10 minutes only, but was so heavy that two of the butterflies were beaten down to the ground, where they remained unable to fly. As soon as the rain stopped, a party of Jungle Babblers (*Crateropus canorus*, L.), came out one after the other from the thicket, and

with much chattering settled on the ground, and started turning the leaves over near where the two butterflies were fluttering. It was not many moments before the leading Babbler spotted the butterflies, hopped up to the nearest and seized it at once; immediately two more of the troop came to his assistance, and the butterfly was pulled to pieces and eagerly devoured, with the exception of the wings. In the meantime some more of the troop similarly dealt with the other *Papilio*. Previous to this episode I had thought *P. aristolochiae* a protected species!

*Nasirabad, Rajputana*: 19 May 1918.—This afternoon whilst I was resting in the heat of the day I was much disturbed by a couple of very noisy sparrows, who for several days past have been constructing a nest on a window-ledge high up in the room, undeterred by the fact that the maximum temperature in the shade has been 110° for the past three days. Whilst considering how to deal with the culprits, I was most interested to see the hen bird catch a butterfly, *Danaiida chrysippus*, L., and, after having carefully nipped off the wings, swallow the remainder of the insect. Evidently *chrysippus* is not protected from attacks from *Passer domesticus indicus*, F.B.I. (Revised ed.)

*Himalaya Club, Mussoorie, W. Himalaya*: 20 July 1919.—Outside my room in the upper storey of the bachelor's quarters here, has been a wonderful place for moths during the past few nights. The verandah is lighted with electricity, and the walls whitewashed. The best nights seem to be cloudy ones with little or no rain falling. Moths come here in hundreds attracted by the light, and are followed by numerous bats, which have a great feast. Along the upper part of the verandah, just below the roof, is a ledge on which many of the insects settle after flying round the lights for a time; this ledge is frequented by several rats, and they may be seen busily feeding on the moths that settle there, more particularly on the stout-bodied ones of the "Yellow-underwing" kind.

INSTANCES OF INDIAN BIRDS ATTACKING BUTTERFLIES.—Prof. POULTON communicated the following observations recorded by Mr. H. Stevens:—

"*Rungagora (Plains), Dibrugarh District, Upper Assam*.—About the year 1902, probably in the early cold weather. Bird: King-Crow or Black Drongo (*Dicrurus ater*, Herm.). Butterfly: *Stichopthalma camadeva*, Westw., a forest insect which had lost its bearings and was flying low over 'the tea,' but managed to escape amongst the crowded bushes, though the Drongo made a determined effort to secure it.

"*Gopaldhara, Rungbong Valley, District of Darjeeling*.—31 August 1917. Elevation 3500 feet. The Ashy Swallow-Shrike (*Artamus fuscus*, Vicill.): successful attack on white butterflies, *Appias* or *Huphina* sp.?

"*Lachung, 8800 feet, Sikkim*.—Early March, 1920. I saw a Nepal Wren (*Troglodytes nipalensis nipalensis*, F.B.I., Revised ed.) make an unsuccessful attempt on a *Vanessa* sp., probably *cashmerensis*, Kollar, as this insect just cleared a stone wall in its flight, though no serious effort was made by the Wren.

"*Bhotan Ghat, Raidak River, Eastern Dooars (base of the Hills)*.—30 January, 1922. The Blue-headed Rock-Thrush (*Petrophila erythrogaster*, Vig.\*): I observed

\* My friend Mr. B. B. Osmaston thinks it probable that *Petrophila cinclorhyncha*, Vig., is the species referred to by the author. Mr. Osmaston informs me that, although he has kept no definite records he has "on many occasions noticed birds chasing and catching butterflies in India."—E. B. P.



a male take toll of white butterflies, probably *Appias* or *Huphina* sp.?, which were common hereabouts.

"This meagre list includes the only instances which have come my way, though I have kept this matter constantly in view. All, with the exception of the first mentioned, were taken note of at the time.—H. S."

OBSERVATIONS BY RODNEY C. WOOD ON BUTTERFLIES AND THEIR CHIEF VERTEBRATE ENEMIES IN NYASALAND.—Prof. POULTON communicated the following interesting notes extracted from a letter written by Mr. Rodney Wood, 8 February, 1929, from the Magombwa Estate, P.O. Cholo, Nyasaland. Accompanying the letter were many specimens, illustrating the injuries caused by enemies, and it was hoped to exhibit these at a future meeting when they had been set and labelled. It was, however, thought better not to defer the publication of these notes, which are of general interest and closely related to those of other naturalists communicated to the same meeting.

"*Seasons.* Our local wet season extends from beginning November to end April, but in this district of Cholo, in the 'tea' belt we get a lot of two- or three-day mists and rains almost each month with exception of September, though the weather from August to beginning November is generally dry and fairly hot, with June and July distinctly cold and subject to these cold wet spells about every two weeks. Insect life is rare in the cold months, extreme dry-season forms showing mostly in August to November and even beginning December, and extreme wet-season forms in January to April. Altitude 2000 to 5000 feet; mountainous, heavily-forested country in this wet belt. Rainfall averages about 60 ins. per year. Maximum temps about 90 to 98 degs. Fahr. Altitude of most of the insects sent you 2700 feet.

"*Injuries.* I planted a large bed by the house giving a compact mass of Zinnias, which prove very attractive to certain species, which comprise the bulk of the material despatched to you to-day, labelled 'Cholo. 2700'.' This I have under constant observation. Such masses of butterflies congregate here that they are always in a continual state of disturbing each other, and fly to such trees as mangos, local large *Brachystegias*, *Bougainvillea*-covered trees, etc., which surround the flower-patch. On these trees are great numbers of small lizards, which I fancy account for most of the damage at the moment when the butterflies settle on these trees. Once settled unobserved I have not seen one attacked yet. Many insect-eating birds are also present such as *Batis molitor*, other flycatchers, many species of shrikes, and bulbuls. I have occasionally seen all of these attack butterflies, the most remarkable case being that of a flycatcher, *Bradyornis murinus pallidus*, which took on 28.iii.26 a male *Acræa terpsichore*, L., within a yard of Judge C. F. Belcher and myself just at the moment I was about to catch the insect, fluttering in the grass and shrubs of the forest with its characteristic slow flight. The bird ate it greedily with no sign of distaste, so I can only imagine that it was either desperately hungry, or that *terpsichore* may not be distasteful, or the rather unbelievable possibility that a spirit of boyish mischief impelled the bird to take something in which Belcher and I were manifestly interested and then sit alongside on a branch like a vulgar small boy might do and gloat over our discomfiture!

"For the last three weeks I have been watching one of the really big chamaeleons (the sp. with a nasal 'horn') literally lapping up butterflies from the Zinnias. It sits on a small branch of Bougainvillea just over some of the Zinnia flowers and takes each butterfly that comes along with unerring marksmanship. With its viscous tongue one would expect that from a chamaeleon. I am trying to find out how often insects escape from it, but so far without success. It takes *Papilio lyaeus*, Doubl., which swarms here daily, with great ease. So I am being forced to the conclusion that it is the smaller lizards that are responsible for most of the wing injuries, through their habit of stalking the butterfly from the rear and then springing at it from behind. All our geckos seem only to take anything while it is actually moving, no matter how slightly, as a tremor of the wings suffices, whereas if completely still they appear to lose all interest in it, even after they have stalked it while it did move. This might in some degree account for the damage which nearly every specimen of all species of *Charaxes* I take has suffered to its tails, as *Charaxes* nearly always 'oscillate' their hind-wings if any danger approaches them.\* I notice this characteristic hind-wing movement *nearly always* occurs when I stalk them myself on rotting bananas and such baits. Papilios of course vibrate their wings all the time they are feeding on the flowers, and the smaller lizards are able to dart at them from branches in contact or even from the stalks of the Zinnias themselves, which are now very strong and from four to five feet high.

"You ask me 'How far were the injuries observed before capture?' I can only say that I am getting to associate certain irregularities of wing outline with the possibility of either lizard or bird damage, and when the butterflies poise over or settle on the flowers I am able to detect such irregularities nearly every time. What chiefly amazes me is the ability of butterflies to carry on very satisfactory flight after literally appalling damage to all wings, provided the costal area of forewings is moderately untouched.—R. C. W."

**SPARROWS FEEDING THEIR YOUNG ON THE MEADOW-BROWN BUTTERFLY (*EPINEPHELE JANIRA*, L.).**—Prof. POULTON said that Mr. C. L. Collenette had kindly called his attention to the following observation by Mr. C. W. Colthrup, in Witherby's *British Birds*, IX, p. 92, 1915-16:—

"On July 28, 1909, at Herne Bay Station, Kent, I watched a pair of House-Sparrows (*Passer d. domesticus*) bring meadow-brown butterflies (*Epinephele janira*) to their young in a nest in the ornamental ironwork at the top of one of the platform posts." The sparrows nipped off the wings, and the author states that, in his observations over a number of years, "in most cases . . . birds nip off the wings of butterflies and moths before eating the bodies."

Mr. Colthrup also referred to an earlier occasion on which he had observed a pair of Stonechats ("Whinchats" in the original paper) feeding their young on *P. corydon*, Poda, first snipping off their wings. This and a similar observation on the Kestrel had, however, been previously recorded and were quoted in Dr. Marshall's paper (*Trans. Ent. Soc. Lond.*, 1909, pp. 342, 352).

\* Compare the "false head" and "tails" at the anal angle of hind-wing undersurface in *Lycaenidae* (*Proc. Ent. Soc. Lond.*, 1906, p. lii; 1922, p. xlix).—E. B. P.

FIELD NOTES ON *EUXANTHE WAKEFIELDI*, WARD, AND SOME OF THE S. AFRICAN *CHARAXES*, INCLUDING A NEW RACE OF *XIPHARES*, CRAM., BY H. CECIL KENWAY, F.E.S.—[Prof. POULTON in the absence of the author communicated the following paper.]

*Euxanthe wakefieldi*, Ward.—This species is, as far as I can discover, a coastal form in South Africa. The most southerly point from which I have any record is Durban, where it has once been taken by Mr. H. A. Millar in March. The next locality is Tugela River Mouth, the seaward end of the boundary between Natal and Zululand, where Mr. V. G. M. Robinson has recorded it on several occasions. At Polana Bush, Lourenço, Marques, both Mr. R. Adkins and I have taken it on every occasion on which we have visited the bush. The months for which I have records of captures are—April, May, June, July, August, November and December. It is probably present throughout the year.

The male is comparatively seldom seen and has a lofty sailing flight during the forenoon, frequently circling round and round one tree or clump of trees, occasionally settling for a very short time on the outer leaves and displaying. It comes readily to bait and is then easily taken. It is also partial to sucking the "German Sausage" or "Cucumber" tree (*Kigelia pinnata*) in the middle of the day and afternoon. It is possibly an outlying member of the *Papilio leonidas*, F., group, mimetic of *Tirumala petiverana*, Dbl.-Hew., but its habits and flight do not suggest a very close association.

The female, on the other hand, is fairly numerous and has entirely different habits. She is very early on the wing and has then a low, fluttering, feeble flight, hovering round low shrubs and perching on the ground or foliage in a tired sort of way. If struck at with the net she is usually taken with ease, but if missed merely flies a dozen yards and settles. Later in the morning she develops a flight like that of the *hippocoön*, F., ♀ of *Papilio dardanus*, Brown, and flies round low trees at a fair pace, but is always easily taken on the wing. Later she joins the male on sucking-trees and comes readily to fruit bait. She finally goes to bed on the twigs under the canopy of *Kigelia* or similar trees. She prefers a horizontal twig and hangs, wings downward, often at 7 or 8 feet from the ground. It is amazing how easy it is to miss her when tucked up for the night, as, once observed, she is very conspicuous. She is a member of both the *Amauris niavius dominicanus*, Trim., and *ochlea*, Boisd., groups—the former on the wing and the latter at rest. Unlike *Hypolimnias dubia wahlbergi*, Wallgr., and *H. deceptor*, Trim., she never develops a turn of speed, even when harassed, and is inferior to the *hippocoön* ♀ in this respect. She has at times a curious habit of sailing like a huge *Neptis*, and (at a much slower speed) sometimes suggests a very leisurely *Charaxes*. I have observed quite a large number of minor differences in wing-pattern, and am collecting as much material as possible with the view of taking photographs.

[These interesting notes on the habits of *wakefieldi* should be read with those recorded by Canon K. St. Aubyn Rogers in *Trans. Ent. Soc. Lond.*, 1908, p. 498.]

*Charaxes varanes varanes*, Cram.—This species is found in varying numbers throughout the coastal belt from Knysna and Mossel Bay eastwards. It is also to be seen throughout the Northern and Eastern Transvaal up to about 3500 feet



above sea-level and all over the low-lying portions of Natal and Zululand. It is common throughout Portuguese East Africa and the lower part of South-east Rhodesia. It is not restricted to forest country, and may be found in fairly open "bush veldt."

The comparatively small thorax and slender costa give a *Salamis*-like air to this species, which is more or less borne out by its flight and habits. (*Papilio nireus lyaeus*, Doubl., is also recalled by its flight.) It has a lofty and irregular flight at times, but sometimes flutters about like a Satyrid amongst low bush. It has a great fondness for displaying, usually choosing a tree with dark glossy leaves, which show off its vivid colouring to perfection. It comes readily to bait, and is very easily taken with finger and thumb when engrossed in feeding, but is, at other times, fairly wary. Its dead-leaf underside shows the most extraordinary variation, recalling *Melanitis leda*, L., or *Precis tugela*, Trim., and when at rest it makes the most of its cryptic coloration, sitting tight till the last possible moment and then bouncing out at tremendous speed.

I have, rightly or wrongly, gained the impression that *varanes* either has fewer enemies or is better protected than the majority of the *Charaxes*. It is not unusual to find very old, faded but undamaged specimens, and I think I have seen fewer mutilated individuals than in most of the species of this genus. I have always had the feeling that *varanes* is a sort of half-brother to the *Charaxes* (it always reminds me of *P. ussheri*, Butl.), as it lacks the robust, business-like flight and general bustling, bullying habits that mark the *Charaxes* as a genus (the Hadrodontiae, at all events). The food-plant of the larva at Durban, *Schmidelia africana*, is recorded by Mr. E. E. Platt of Durban.

*Varanes* flies practically all the year round.

*C. candiope candiope*, Godt.—I have only in recent years realised the wide distribution of this handsome species. It has much the same range on the eastern side of South Africa (but not, I think, on the south coast) as *varanes*, but extends to higher altitudes and colder regions. It is not uncommon round Pretoria, where in June and July sharp frosts are frequent. Never as common as *varanes*, *candiope* is in some years so scarce, even in its favourite haunts, as to give the impression of rarity. It is a true forest species, and I have never found it in the open country. Swift, bold and greedy, it is very easily taken at bait or even when displaying, but has a habit of diving off bait or perch that sometimes upsets calculations. In Natal it is known as the "Sugar Butterfly," owing to its habit of settling on pools of molasses or treacle left on the railway line by passing sugar-trucks. I have been unable to detect any seasonal variation, but am satisfied that the specimens taken in the Waterberg and round Pretoria are considerably smaller, darker and more brightly coloured than the coast forms. Mr. Platt gives *Croton sylvaticus* as the food-plant in the Durban district.

*Candiope* at the coast is present in practically every month of the year, but is more numerous in the period November–May than during the winter and spring.

*C. protoctea azota*, Hew.—This species, as far as South Africa is concerned, is confined to the country lying east of the Drakensberg and Melsetter ranges, and

southwards it does not appear to extend much beyond Delagoa Bay, though I am hopeful of securing it as far south as the Dukuduku Forest at the mouth of St. Lucia Bay, Zululand. It has recently been taken near Graskop, Transvaal. *Azota* is in some seasons quite numerous at Lourenço Marques, where I have observed it flying round the "Flamboyant-tree" (*Poinciana*) in February, March, and April. I do not think the ♀ is a very close mimic of *candiope* or *varanes*, as its black, red and white colouring render it even more conspicuous than either, and the black markings give it a most distinctive appearance on the wing. It has the same habit as *varanes* of sitting tight on a branch and bouncing out almost in one's face. It is easier to take than *varanes*, as, though swifter, it is bolder and can always be netted easily when displaying before coming to bait. Of all the *Charaxes* I know *azota* ♀ is fondest of displaying—quite flat, as if set—on a drooping branch facing the sun. She then forms a most beautiful picture against the dark green bush. Whether this species is distasteful or aposematic I do not know, but, like *varanes*, the female may be taken old, worn and battered, but seldom mutilated. The male I have seldom seen as he appears far shyer than the ♀. He is, moreover, easily mistaken, when flying high and swiftly, for any of the smaller dark *Charaxes*. *Azota* appears to be a true forest species, but the ♀ is not shy of leaving the cover to disport through the main streets of Lourenço Marques in the company of *brutus* and *castor*. It has always struck me that the boldness of the very conspicuous ♀ suggests some special form of protection, but I have not, up to the present, been able to ascertain what it is. The ♀ is as greedy as *candiope* and, if anything, more easily taken at bait. This species has been extremely rare during the drought of the last two years.

*C. pelias pelias*, Cram., and *p. saturnus*, Butl.—This is the most abundant and widely distributed *Charaxes* in South Africa. Except that I have never encountered it in heavy forest on the Drakensberg, I think that either *pelias*, *saturnus* or its ab. *laticinctus*, Butl. are everywhere in South Africa, provided that there is any bush capable of feeding the larva. Whilst Trimen states that *Protea* is the food-plant of *pelias*, in the Western Province of the Cape I have taken *saturnus*, ab. *laticinctus*, larvae on *Burkea* sp., and also on cultivated peach-trees. I imagine that the *Charaxes* are fairly general feeders, as almost every authority seems to give different food-plants for the same species, whilst in some species at least half a dozen food-plants are known in one locality. The wide distribution and usual comparative abundance of *saturnus* suggest a wide range of diet.

With *pelias pelias* I am not familiar. It is a purely western form and apparently extends up to Angola. I have not yet encountered it in the field. *Pelias saturnus* is the form found in the Western Transvaal, and, I believe, generally in Southern Rhodesia. In Natal and the Transvaal generally I think the ab. *laticinctus* is the dominant form, though *saturnus* also occurs, especially in the western areas, whilst at Lourenço Marques there is a pale form which most undoubtedly mimics *castor flavifasciatus*, Butl. I hope to send you a specimen before long. The S. African *p. saturnus* is not really a very interesting form from the bionomic standpoint, but, as the most pugnacious and daring and one of the swiftest of our *Charaxes*, is always worth trying for, especially as it seems to be about the hardest to secure undamaged. The male is attracted by the dung of carnivorous animals, whilst the ♀ prefers fruit.

This species inhabits almost any type of country and any elevation from 7000 feet to sea-level, but has a predilection for the bare or bush-clad tops of hills. On the Magaliesberg Range, north of Pretoria, the crest is of bare quartzite, and, on any fine day from November to the end of May, a stroll along the ridge discloses the fact that the whole length (60 miles) has been divided up into "beats" of a couple of hundred yards, each guarded by a vigilant male *saturnus*. Let one trespass on the beat of another and, with a sharp rustle of wings, out dashes the guardian of the beat and a running fight of half a mile and back takes place, usually complicated by the intervention of some three or four apparently exasperated individuals over whose preserves the original antagonists have carried their battle. Having disposed of his trespasser (curiously the defender always seems to win) *saturnus* returns to his nice warm rock perch all ready for another "scrap" at a moment's notice. Any passing butterfly is good enough for him to attack—preferably *Papilio demodocus*, Esp., which has a habit of zigzagging about all over the place, but it is only another *saturnus* that is capable of rousing him to more than a hurtling, bullying rush and swift return. He is not afraid of giving away weight either. In 1917, in the apricot season (December), I went out to the orchard one morning for a matutinal gorge. On approaching a favourite tree, to my amazement a *saturnus* shot out and literally smacked my face. I was surprised. Captain John Swinburne was also attacked in a most ferocious manner whilst riding his motor cycle at Smits Drift near Pietersburg. As an instance of his fighting capacity I once saw a small and war-worn *saturnus* take possession of a sucking-place on a *Buddleia salvifolia* and hold it against several ♂ and ♀ *xiphares* (twice his fighting weight), a couple of *druceanus*, a *candiope* and a *varanes*. The battle lasted over an hour until, wanting a *xiphares* ♀, I chased *saturnus* away. He was most indignant and hung about the vicinity until I left, obviously intending to return as soon as the coast was clear. The habit of jostling and squabbling is very pronounced in the *saturnus* (*epijasius*) group, and they are the most quarrelsome and ill-tempered of all the *Charaxes* I know.

On the High Veldt, *Zisypheus mucronata* is usually the favourite sucking-tree, but *Dombeya* sp. *Sclerocarya caffra*, *Syringa* and *Chrysophyllum magalies montanae* are almost equally popular.

Round Pretoria *saturnus* is fairly common almost throughout the year. On the Magaliesberg, the north face of which is free from frost from a line about 100 feet above the plain to within a few yards of the crest, I have taken specimens in every month of the year except June and July. I had a curious experience with *saturnus* one day. A male was sitting on the edge of a flat slab of rock, facing outwards. I made the usual sharp upward stroke of the net just in front of him. To my amazement he went up and back at an angle of about 45 degrees instead of making the usual forward and downward spring.

*Saturnus*, *brutus* and *castor flavifasciatus* are very much alike from below with the sun shining through the wings.\* *Castor's* more powerful flight and greater size are not always immediately noticeable. *Saturnus* is not so keen on "displaying" as some others (the *Tiridates* group for instance), but usually sits on the top of an outer spray of a tree, with wings held at an acute angle—just a capital V—the

\* The author writes that, at Lourenço Marques, "*saturnus* is as pale as *castor flavifasciatus*."



picture of alertness. It has the most marvellous judgment as to the psychological moment for a strategic disappearance. It is, likewise, a marvellous judge of weather, and, detecting the approach of a thunderstorm long before the birds take alarm, at once goes to bed under a stout twig or branch, "pluviotroping" (if I may coin the word) with great skill. This sensitiveness to weather is common to most or all of the *Charaxes* and has often saved me from a soaking. On one occasion, when inspecting for a forest survey, my assistant and I were sitting very comfortably under the verandah of the forest quarters when the Conservator, District Forest Officer and Survey party arrived like drowned rats because they pitted their experience against the instinct of *druceanus*. I jeered and can imagine that the *Charaxes* also enjoyed the joke.

*C. castor flavifasciatus*, Butl.—The range of *castor* in South Africa appears to be limited to the low-lying country to the east of the Drakensberg and the Swaziland massif. It has been recorded from Durban in Natal, Empangeni in Zululand, Eureka near Barberton, Leydsdorp\* in the Transvaal and Lourenço Marques in Portuguese East Africa. Of these occurrences I have personal experience. At Lourenço Marques I have taken *castor* in the years 1923, -5, -6, and -7, and during the months of March, April, May, June, July and August.

*Castor* is a very bold, powerful flier and seems equally at home on the wharves of the port, in the streets, the botanic gardens and the public square. Whilst never abundant it is usually present during most of the early autumn and on to early spring. I have never seen it in November, December or January, but am not prepared to say that it is absent during those months, as I have only paid a few visits to "The Bay" at that season. At once the largest, swiftest, strongest, boldest and wariest of our *Charaxes*, *castor* falls a ready victim to the lure of Bacchus, for like *brutus* it has an insatiable love of strong drink which enables the possessor of a steady hand to take the butterfly undamaged from the bait of fermented fruit with thumb and forefinger. *Castor* seldom wastes time in displaying, but usually comes down from the tree-tops like a shot from a gun, straight to the bait. At Polana Bush, a beautiful little strip of forest between cliff and Bay at Lourenço Marques, now, alas! being ruined by campers, I have spent days on end baiting for *Charaxes* and have delighted in the glorious sweeping flight of *castor*. Freer from inequalities than any other, it displays a power borne out by the tremendous thorax and thick costal edge of the fore-wing. *Castor* seems to depend on sheer speed for safety, and appears to use cryptic coloration less as a defence than most of the genus, perching fearlessly on the smooth grey bark of the *Kigelia* or on its yellow-green leaves. In spite of his "broken up" underside coloration he is, next to *brutus*, the most conspicuous of our *Charaxes* when resting. Wing damage is fairly frequent, but not nearly so often as in most species. I think that an extraordinary power of getting off like a flash at the near approach of danger and an almost incredible speed have much to do with this comparative immunity. *Castor* shares with *saturnus* a perfectly Hibernian love of a "scrap" and, owing to his tremendous power is cock of the walk on bait or sucking-tree.

\* Mr. Kenway informs me that the *castor* from near Leydsdorp is the melanic form *reimeri*, Rothsch. It was discovered in this locality by Mr. van Son of the Pretoria Museum.—E. B. P.

From specimens in my collection from Sierra Leone and from South Africa, I imagine that *castor castor* averages quite half an inch greater expanse of wing than *c. flavifasciatus*.

*C. brutus natalensis*, Stgr.—This is one of the widely distributed species, which, whilst commonest at the coast, are found as much as 200 or more miles inland. I have *brutus* from all round the Natal coast belt, Portuguese E. Africa, Eastern Mashonaland and the Eastern, North-eastern and Northern Transvaal. At Lourenço Marques *brutus* is easily the commonest *Charaxes*, and is a perfect nuisance at bait as it sometimes assembles in such number as to render it impossible to get at the rarer species on the fruit.

I once had an extraordinary experience with *brutus*. One afternoon in July, 1926, at Polana Bush, Lourenço Marques, I was walking round my baits with Mr. Champion Russell. It was a cold afternoon and the only *Charaxes* on view was an old, battered *brutus* ♀ which had been imbibing for some time from a bait placed in a cocoanut husk in the middle of a grass plot about 5 yards by 3. I had driven her away three or four times, and finally took up the bait and placed it on the sand about 30 yards away on the other side of the road. Within a minute *brutus* returned to the spot where the bait had been and hovered about 9 inches from the ground, obviously puzzled by its absence. After hanging for half a minute or more over the exact spot she started to quarter the grass like a dog hunting for a scent. She continued this for quite two or three minutes and then returned to the spot where the bait had been. After making sure that it was not there she started an upward spiral until she was about 8 feet from the ground and 15 yards from her starting-point, when, scenting the bait, she banked sharply and shot straight down to it. I left her to it as I thought she had earned it. This incident is so incredible that I should be glad if you will ask Mr. Russell to corroborate it.\*

The most noticeable thing about *brutus* is the extraordinary amount of variation in the submarginal hind-wing spots. This is neither seasonal nor local, as specimens in which the spots are practically absent may be taken at the same bait together with others having heavy spots, and with all the intermediate forms. Another curious thing is the enormous range of size in both ♂ and ♀. I have ♀♀ as large as *castor* and as small as *ethalion*, Boisd., and the males are equally variable.

*Brutus* is swift, bold, gluttonous and fond of display, but is I think, less combative than most of the group. I have an idea that it may owe something to *Papilio echerioides*, Trim., ♂, as a model, but am not yet convinced. As a matter of fact I have not yet seen the two species in the same locality. *Brutus* is extraordinarily like *castor* when on the wing and seen from below. I have specimens taken in every month of the year.

*C. druceanus druceanus*, Butl.—I first encountered this species on the Iron Crown Mountain near Haenertsburg, Transvaal, at about 6000 feet elevation, and

\* Mr. Champion Russell kindly wrote on April 27 :—" I well remember the *Charaxes* coming back, and to all appearance, quartering the ground in a very workmanlike way, in order to find the bait, with, as I remember, a constant hankering after the original site (' I think it must be there after all ! ' sort of thing). I do not remember the ' spiralling ' but I remember that she suddenly seemed to get scent of it when fairly high up, and made for it straight. I think there is little doubt that she was hunting by scent."—E. B. P.

have since found it fairly abundant (though very local) all along the Transvaal Drakensberg at from 4000 to 6000 feet. On Marieps Mountain it is very abundant and is the commonest *Charaxes* at from 6000 down to 2500 feet. It occurs in Natal at Pinetown and at Gillets near Durban and is occasionally, though rarely, found in the Melssetter range, in S.E. Rhodesia.

The distribution and habits of this *Charaxes* are somewhat puzzling to me. For years I considered it a mountain form, but am not now so sure, and hope to be able to spare time to study it more carefully. Its occurrence at Eshowe in Zululand and at Pinetown, within sight of the sea, on small hills, in a subtropical climate, has led me to believe that it is more widely distributed than I had believed.

In habits it is very like *saturnus*, but it is, I think, less wary, and it differs in being emphatically a forest form. The male is far swifter than the ♀, and often looks black when flying swiftly round trees. The female, though not very like *saturnus* when set in the cabinet, is almost indistinguishable on the wing if the underside is invisible. The metallic bars on the hind-wing underside are very conspicuous when at rest, and the difference is then very apparent. *Druceanus*, both ♂ and ♀, comes greedily to bait, and I have taken a male on banana at 7 a.m.—a most unusual thing, as in my experience *Charaxes* practically never feed before 10.30 a.m. The food-plants are *Eugenia cordata* and *E. gerrardi*.

### C. xiphares, Cram., subsp. n.\*

[This interesting new race of *xiphares* was referred to in the following extracts from three letters received from Mr. Kenway, who kindly sent the two females forming the material on which the subspecies has been based. I am indebted to Lord Rothschild for kindly giving me the benefit of his great experience.—E. B. P.]

8 January, 1927.—I have just come back from Haenertsburg, a delightfully cool place in the Drakensberg where I went to study the white-spotted form of *Charaxes xiphares*, Cram., ♀, and was most successful. I not only got about 20 specimens

\* *Charaxes xiphares kenwayi*, subsp. n.—The female (I have not yet had the opportunity of examining the male) is considerably smaller than that of *x. xiphares*, Cram., and *x. nandina*, Rothschild, the type specimen measuring 49.5 mm. from the tip of F.W. to centre of thorax opposite the base of the wing. The second female is of about the same size although the worn tips of the wings prevent an accurate measurement. Four ♀ *x. xiphares* varied from 54.0 to 56.5 mm., while 2 ♀ *x. nandina* with the tips of F.W. worn were about 56.0 mm. Unless otherwise stated the differences described below are common to both females of *kenwayi*.

*Fore-wing upper surface*.—Post-discal spots of the type ♀ are as in *x. xiphares*; more strongly developed in the other ♀ and therefore approaching *x. nandina*. The white spot in area 1 b., absent or small in *x. xiphares*, is well developed in both females, again approaching *x. nandina*.

*Hind-wing upper surface*.—The central patch is much paler than in the other two races, being white in the type and creamy white in the second ♀. In both, the margins of the patch are yellow with scattered black scales as in the other races. The submarginal blue spots are more strongly developed than in the latter.

*Hind-wing under surface*.—The outermost member of the lunulated external border of the irregular pale median band is much paler and less developed than in *x. xiphares*, being transitional towards *x. nandina*, in which the dark lunules are still less emphasised. A conspicuous feature in the pattern of *x. xiphares* and *x. nandina*, formed by the broad, irregular tract of paler ground-colour with prominent white borders each edged by a narrow black line, and crossing the base of areas 7 and 8 and the cell near its centre, is far less prominent in *x. kenwayi*, the enclosed ground-colour being similar to that of the general surface, the white borders narrower and the black lines much reduced, the inner being obsolescent in area 8, as also the inner white border in the cell.

Type and Paratype, ♀♀ from Haenertsburg, Zoutpansberg district in Hope Coll. The type dated Dec. 24.—E. B. Poulton.



(2 perfect and about 4 quite good), but was able to observe the flight of the female, as the feeding bushes (*Buddleia salrifolia*) were low and the insects were sucking within 10 feet of the ground. I have always felt sure that *C. xiphares*, ♀♀, both buff-spotted and white-spotted, belong to the *A. niavius dominicanus*, Trim.—*ccheria*, Boisd., mimetic combination. On this occasion there was no doubt about it. *C. xiphares* was more abundant than I have ever seen it before, and could be flushed from every bush by walking past. In every case the ♂♂ left the bushes with the rustling, darting *Charaxes* flight; whilst the ♀♀, especially the white-spot variety, displayed the sailing *Amauris* flight unless or until scared by being struck at by the net. In many cases they sailed round and round the bushes quite slowly, often settling displayed as if set in the manner of *C. azota*, ♀.

28 February, 1927.—I have written about a female *C. xiphares* in which the patch in the hind-wing is *white* instead of *buff*. This variety I have only found in one spot about fifty yards square on the farm "Westwood," near Haenertsburg, lat. 24° S.; long. 30° E., elevation 5000 feet above sea. I have caught at least 30 specimens, and am sending a battered one for examination of the sexual appendages for the determination of the species. The wing-pattern and expanse are extraordinarily constant (which is not the case with the buff-spotted type form).

You will be interested to hear that this form of female has a habit which I have not observed in the type form or in the male. Both the latter, on being disturbed, make off at a tremendous pace, but the white-spotted form, if not badly scared, comes sailing towards the intruder with a flight very like that of *Amauris n. dominicanus* or the mimetic flight of *Hypolimnas dubia wahlbergi*, both of which it then resembles to a degree that must be seen to be appreciated. When on the wing, the mimicry is absolutely perfect.

23 October, 1928.—With reference to the ♂, I have not been able to establish any difference between those caught at Haenertsburg and elsewhere. As to the small size of the new ♀, all the *xiphares* I have caught in the locality have been about the same. The large forms taken in the Transvaal come from Barberton or Marieps Mountain. The largest I have ever seen are from Eshowe in Zululand and the next in size from above Pietermaritzburg, Natal.

EXHIBITION OF THE SPECIMEN OF *PANGONIA VARICOLOR*, WIED., REFERRED TO BY BURCHELL IN 1813.—Prof. POULTON said he thought that, after the observations on *Pangonia* communicated to the last meeting, the Fellows would be interested to see again the specimen, still in excellent condition, of which W. J. Burchell had recorded, 27 November, 1813—"the fly that sucks the oxen without settling upon them" (*Proc. Ent. Soc. Lond.*, 1916, p. xc).

*HELIPTERA LONGICEPS*, FOWL., A TROPICAL AMERICAN HOMOPTEROUS INSECT WITH AN APPARENT HEAD AT THE POSTERIOR END.—Prof. POULTON exhibited the small plant-hopper *H. longiceps*, captured by his friend Dr. J. G. Myers in Trinidad, near Sangre Grande, in the Mora Forest, where the predominant tree was the Leguminous *Dimorphandra mora*. Dr. Myers, when he took the insect, thought it was a Jassid leaf-hopper and killed it under this impression: it was not until he examined it in the laboratory that he realised that the tail had been mistaken for the

head. The remarkable apparent eyes were situated on the posterior ends of the tegmina and, when these were approximated in the resting attitude, the appearance of a head was very striking—far more so than that of the small true head with its comparatively insignificant eyes. Mr. W. E. China had kindly determined the species.

**THE QUEENSLAND PINK BOLLWORM.**—Dr. F. G. HOLDAWAY exhibited adults of *Pectinophora scutigera*, Holdaway (Queensland Pink Bollworm), together with comparative diagrams of the male genitalia of this insect and of *P. gossypiella*, Saunders, with which it has been confused.

Externally, the adults of *P. scutigera* are at present indistinguishable from those of *P. gossypiella*. The larvae, however, are quite distinct, as also are the genitalia of the two insects. When in 1924 during the revival of the Australian cotton industry, it was announced that the "Pink Bollworm" had been discovered in Queensland, agriculturists were greatly perturbed as to the future of the industry. However, the insect attacking the Queensland cotton crops is now known to be an indigenous species, and it is restricted mainly to the coastal belt in proximity to its natural host-plants.

Larvae of *P. gossypiella*, *P. scutigera* and a third species also indigenous to Queensland, and the adults of which have also been confused with *P. gossypiella*, were also exhibited.

### Wednesday, May 1st, 1929.

Dr. K. JORDAN, President, in the Chair.

#### Election of Fellow.

The following was elected a Fellow of the Society :—ERNEST FREDERICK BURDETT, 70, Hamilton Crescent, Eastcote Lane, South Harrow, Middlesex.

#### Exhibits.

ON THE DIFFERENCE IN POSITION OF CERTAIN ♂-CHARACTERS IN SOME ALLIED GENERA OF ANTHRIDAE.—The PRESIDENT exhibited some ANTHRIDAE, and

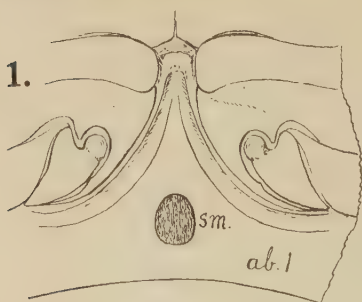


FIG. 1.—*Ptychoderes nebulosus*, Oliv. 1795.

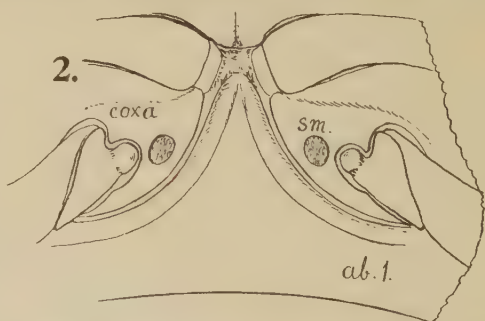


FIG. 2.—*Phlocotragus hottentottus*, Schoenh. 1839.

said in explanation that secondary male characters had a tendency in this family of beetles to disappear within the genus and to shift their position in closely allied genera. This latter phenomenon seemed to him to be of particular interest. In the males of *Ptychoderes* (S. & C. America) there is a groove on the first abdominal

sternite filled in with hair (Fig. 1, sm.), the same sex-mark being present in the Oriental genus *Phloeopemon*, whereas in *Phloeotragus*, which represents these genera in Africa, the mark is either absent or is replaced by a small groove situated on each hind-coxa (Fig. 2). In *Meganthribus*, an Oriental genus, we find the velvety



FIG. 3.—*Meganthribus whiteheadi*, Jord. 1895.

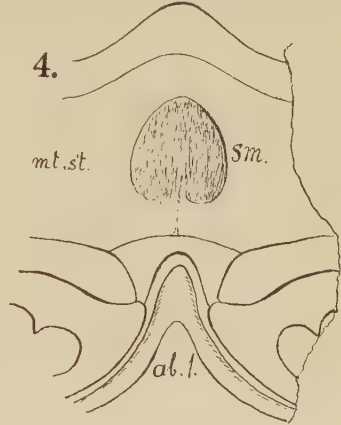


FIG. 4.—*Mecocerus allectus*, Pasc. 1862.

spot on the first abdominal sternite (Fig. 3, sm.) and in its near relations *Mecotropis* (Oriental) and *Mecocerus* (Oriental and African) (Fig. 4) it is shifted on to the centre of the metasternum. A very different secondary male character is present in a

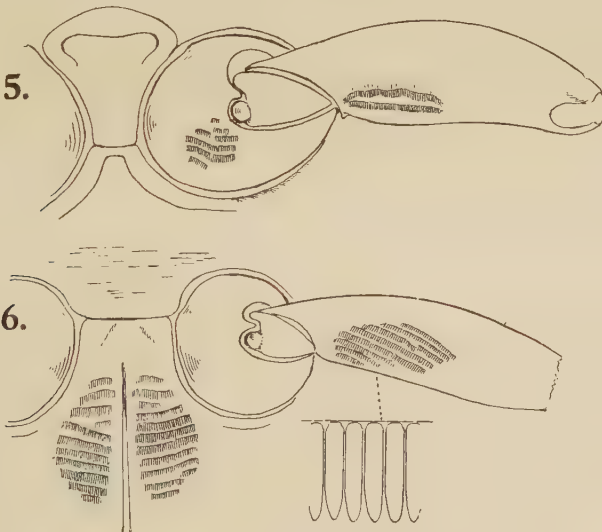


FIG. 5.—*Nemotrichus barbicornis*, F. 1801.

6.—*Habrissus fasciatus*, Jord. 1895.

number of species of *Nemotrichus* (S. & C. America). Here the sex-mark consists of combs of flat spines on the mid-coxa and mid-femur (Fig. 5), the spines lying close together flat side down and in more or less regular rows. The genus is replaced in the Oriental Region by *Habrissus*, most species of which also bear combs; but here they are placed on the metasternum and mid-femur (Fig. 6), or only on the



metasternum, apparently never on the mid-coxa. These male organs evidently have some function in mating; but there are no corresponding structures on the back of the females.

NEW MIMETIC FORMS OF LEPIDOPTERA.—Mr. G. TALBOT exhibited and made remarks on :—

1. A new genus of LYMANTRIIDAE from Nyasaland, the ♂ of which bears a close resemblance to the Zygaenid moth *Staphylinochrous whytei*, Butl., also found in Nyasaland. The ♀ resembles some species of the Agaristid moths of the genus *Heraclia* (*Xanthospilopteryx*). This is the first instance known in which this type of pattern has appeared in the Lymantriids. Both sexes of *Bracharoa charax*, Druce, resemble the ♂ of this species.

2. A new genus of PERICOPINAE from Venezuela, the insect being almost an exact copy of the Diopiid moth, *Thermidia dimidiata discinota*, Warr., from the same locality.

3. A new genus of LYMANTRIIDAE obtained by Mr. T. A. Barns, on the main peak in Princes Island, Gulf of Guinea and described as *Heptaptosis joiceyi* in the *Bull. Hill Mus.*, iii, part 1, 1929.

4. A new genus of ARCTIIDAE represented by a single male obtained by Mr. T. A. Barns in Angola, this insect being strangely like *Spilosoma pura*, Leech, from China.

5. A new race of *Papilio philonoe* from the Imatong Mts., south-east Sudan, obtained by Capt. R. Whalley, and described after him in the *Bull. Hill Mus.*, iii, part 1, 1929.

6. *Papilio cacicus* ♀ f. *zaddachi*, Dew., together with *Brassolis astyra haenschii*, Stich., ♀, both from Ecuador, the reddish-brown band of the fore-wing being similar in both insects, and the same pattern occurring in *Papilio enterpinus*, G. & S.

The exhibitor said that descriptions of these new genera will be published in the *Bull. Hill Mus.*, 1929.

REVERSED COLOURING IN *FIDONIA PLUMISTARIA*.—Mr. N. D. RILEY read the following portion of a letter received from Col. H. D. PEILE from the south of France :—

“The explanation of the ‘reversed colouring’ of the wings of this moth that I would suggest is that the upperside of the fore-wings and underside of the hind-wings would blend well with the bark of a pine-tree. Possibly these moths pair settled on the bark, or perhaps the ♀ lays its eggs on pine-bark, so that when settled with the wings thrown back the protective fore-wings conceal the upperside of the hind-wing; or if settled with wings up over the back and fore-wing thrown back, then the protectively coloured hind-wing conceals the underside of the fore-wing except just where the edge of the fore-wing is like the hind-wing. In both cases the exposed wing surfaces camouflage the settled insect.”

Dr. P. A. BUXTON showed numerous lantern slides to illustrate the haunts of Samoan Insects.

LIVING LARVAE OF *CHRYSOPHANUS DISPAR BATAVUS*.—Mr. H. M. EDELSTEN exhibited living larvae of *Chrysophanus dispar batavus*, Oberth., from the Colony at Wood Walton Fen, and presented the following :—



EXPLANATION OF PLATE II.

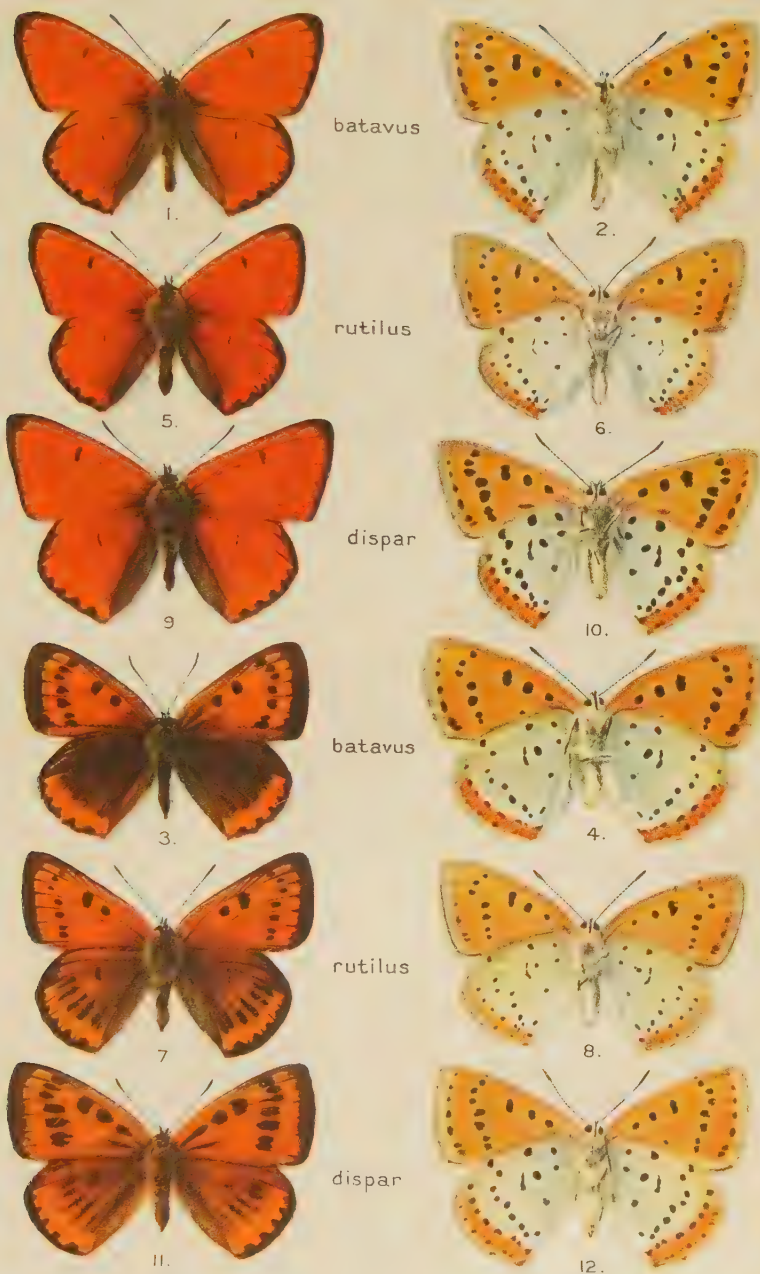
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FIG. 1. ♂ upperside; 2, ♂ underside; 3, ♀ upperside; 4, ♀ underside of *Chrysophanus dispar batavus*, Oberth.

5-8. The same, of *C. dispar rutilus*, Werneb.

9-12. The same, of *C. dispar dispar*, Haw.





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THREE RACES OF *CHRYSOPTERUS DISPAR*:  
BRITISH (*DISPAR*), DUTCH (*BATAVUS*) AND CONTINENTAL (*RUTILUS*).



**Report of the Committee appointed by the Entomological Society of London for  
the Protection of British Lepidoptera.**

PLATE II.

The earliest reference to *Chrysophanus dispar* in the literature of the Science of Entomology was made by Esper, who in *Schmett. Eur.*, pl. xxxviii, figs. 1<sup>a</sup> and 1<sup>b</sup>, illustrated both upper- and under-sides of the male and female, naming the insect "*hippotoe*" var. (1777). On page 350 (1779), whilst naming it "*hippotoe*," he doubts whether it is specifically identical with *hippotoe*, Linn. The specimens figured were from a Bavarian cabinet, but Esper knew nothing of their origin. The form figured, however, is nearer to *C. dispar dispar*, Haw., or the recently discovered Dutch race, *C. dispar batavus*, Oberth., than to the widely spread European race, *C. dispar rutilus*, Werneberg, the colour of the hind-wings and the brightness of the copper-colour band on the underside much more nearly resembling the former two races than the latter.

*C. dispar* was first noticed and figured as a British species by Lewin in *Insects of Britain* (1795), p. 84, and pl. xl, figs. 1-3. Lewin's figures represent *dispar*, but he calls the species *hippotoe*. He states, "some specimens were met with in Huntingdonshire on a moorish piece of land," evidently meaning by this description a piece of fen. In 1798 Donovan in *Nat. History of British Insects*, VII, p. 4, pl. 217, described and figured the species, still as *hippotoe*; he mentions that he had heard it had recently been found in Cambridgeshire. In 1803 Haworth in *Lepidoptera Britannica* (p. 40), recognising its distinctness from *hippotoe*, named it *dispar*, describing it as "a new and very beautiful species." Haworth stated that "the butterfly in July frequents the marshes of Cambridgeshire." From then onwards for twenty or thirty years *dispar* was discovered in several fens in Huntingdonshire and the surrounding districts, and was erroneously reported from Wales, Scotland, Yorkshire, and other parts of Britain.

Tutt (*British Lepidoptera*, VIII, p. 460) rightly rejecting many reputed localities, cites the following as authentic: "Cambridge (Haworth); near Ely (Skrimshire); Whittlesea Mere (Standish); Hunts (Lewin); Yaxley Mere (Standish); Holme Fen (Stretton); Trundle Mere (Dale); Norfolk, Bardolph Fen (Skrimshire teste Curtis); Suffolk, Benacre (teste Stephens)." There seems no reason to doubt but that these localities represented practically the entire distribution of *dispar* in Britain.

The butterfly during the first half of the last century occurred and was collected abundantly in some of these localities, but owing to various causes it became scarce about 1840, and in 1847 or 1848 the last recorded specimens, five in number, were taken by Stretton in Holme Fen.

There can be but little doubt that the collector was almost entirely responsible for the butterfly's extermination. There were no doubt other causes, such as the drainage of its haunts; but there are still some at least of these, including Holme Fen, in very much the same condition as they were in a hundred years ago, and still capable of sustaining *dispar*, if the collectors had not wiped out the race.



For many years after its discovery in Britain *dispar* was supposed to be a purely British species. The old Lepidopterists were very proud of it, and used to style it "the glory of British Entomology," but in 1871 it was identified by Staudinger as a local race—the finest of all—of a widely distributed Palaearctic species, which had been named *C. rutilus* by Werneberg (*Beiträge*, pp. 243, 391, 464, 1864).

*C. dispar rutilus*, as stated above, is widely distributed throughout Continental Europe, extending into Western Asia. It has been recorded from Northern Africa, but the record has never been confirmed. In the West, in France and Northern Italy it is local and uncommon, becoming much more abundant and universal in Central and Eastern Europe, and in Western Asia.

In the southern and warmer districts it has two broods each year, in June and August, but in the more northern and colder regions there is only one brood, the emergence usually taking place in July. The single-brooded race naturally is larger and finer than the double-brooded one, and of the latter the specimens of the second emergence in August are usually very small.

In Eastern Asia the place of *rutilus* is taken by another form, *auratus*, Leech, described in *Proc. Zool. Soc. Lond.*, 1887, p. 414, pl. xxxv, fig. 3.

#### Comparison of the Dutch, the Continental and the extinct British races.

In 1915 there was discovered in Holland, in the province of Friesland, a new race closely resembling the lost British form, with which at first it was indeed supposed to be identical. Four examples of this race were exhibited by the late N. C. Rothschild at the meeting of the Entomological Society of London held on October 6th, 1915, the exhibitor stating (*Proceedings*, 1915, p. lxxx) that he believed the specimens in question to be identical with the extinct British race. This race was subsequently referred to by Riley (*Entomologist*, LIII, p. 10, 1920), who gave a list of some of its distinctive characters, and later was very fully discussed and described by J. Th. Oudemans in *Tijdschrift v. Entomologie*, LXV, pp. 197–211 (1922), and figured on pls. v and vi. On pls. iii and iv were reproduced for comparison photographs supplied by the British Museum (Natural History) and made from the unrivalled series of the extinct *C. dispar dispar* in the possession of that institution. Oudemans refrained from naming the Dutch race; this was left for Oberthür to do in *Études Léop. Comp.*, XXI, p. 73, pl. 570, figs. 4914–5 (1923), where it was described as *C. dispar batavus*.

The subspecies *rutilus*, typically from the Berlin marshes, is so abundantly distinct from both *dispar* and *batavus* that it is hardly necessary to call attention to the distinguishing features. The narrowness of the marginal reddish band on the lower surface of the hind-wing and its frequent obsolescence towards the apex, provide the surest guide to its recognition in both sexes; the ground-colour of the lower surface of the hind-wing is also rarely suffused with pale blue to anything like the extent that is normal in *dispar* and in *batavus*; the numerous white-ringed black spots that ornament the lower surfaces of both wings are never so large as in *dispar*, although occasionally approaching *batavus* in this respect; the reddish marginal band of the hind-wing, and the disc of the fore-wing are usually approximately of the same colour, orange, seldom reddish; and in the males approximately 50% show no trace of a black spot in the discoidal cell.

The differences between subspecies *batavus* and the extinct typical *dispar* are of a different order. *Batavus*, at first glance, gives the impression of having the coloration of both surfaces the same as in *dispar*, but the maculation of the lower surfaces of the wings as in *rutilus*—characters that are not easy of precise definition, although readily appreciated from the comparison of long series—in this case 65 ♂, 51 ♀ *dispar*, 21 ♂, 19 ♀ *batavus*.

Comparison of the uppersides of the males reveals no tangible colour differences; but whereas no British males were found to lack the black spot in the discoidal cell of the fore-wing, in 5% of the *batavus* it is absent and in 19% only just traceable. It is interesting to note in this respect the pronounced difference between the original type series of *batavus*, captured in 1917 and 1918, and those bred at Wood Walton Fen, ten years later. In the case of the former the proportions of males showing (1) distinct spot, (2) trace of spot, (3) no trace, expressed as a percentage of the series are 33%, 50%, 17%, respectively; in the case of the latter 93%, 7%, 0%. Sixty-five *dispar* give the following results: 90%, 10%, 0%. It is permissible to wonder whether there is not already indicated by these figures a tendency towards the greater melanism so characteristic of true *dispar*. The number of specimens examined is, of course, really too small to allow of the drawing of definite conclusions, but the data are distinctly suggestive.

The only other feature of the upperside of the male that exhibits a pronounced average difference is the black bar across the end of the discoidal cell of the fore-wing. In *dispar* this is usually (average of sixteen specimens) about 1 mm. wide, and in *batavus* rarely more than 0.75 mm. wide, usually much less. This feature again shows a marked approach towards *dispar* in the series from Wood Walton Fen.

The upper surfaces of the wings of the females exhibit no constant or obvious differences. On the fore-wings the postdiscal series of black spots, however, nearly always appears to be larger in *dispar* than in *batavus*. In order to test the reality of this, the length of the spots in areas two and three were measured in twenty specimens of *dispar* taken at random and in the nineteen *batavus*. The averages worked out at 2.6 mm. and 2.52 mm. in the case of the former, 2.06 mm. and 1.83 mm. in the case of the latter; and whereas in *dispar* no spot was less than 2.0 mm. long, in *batavus* seventeen (of the thirty-eight) gave measurements under 2.0 mm. The tendency of the spots of the postdiscal series to extend in the form of narrow rays towards the wing-base appears to be equally strong in both races. Another character of some value is provided by the presence or absence of a black wedge-shaped basal mark in the cell of the fore-wing. In the case of the thirty-nine females referred to above, this mark is clearly present (*i.e.* readily seen and darker than the ordinary dark basal suffusion that affects all the surrounding area) in fourteen of the English specimens, but in only six of the Dutch. The hind-wings afford no more definite criteria than do the fore-wings. Females may readily be grouped under two heads in respect of the coloration of the hind-wing, irrespective of the red marginal band that is always present, (1) those in which the whole wing is black there being red scales at most *actually upon the veins* (veins 2, 3 and 4), and (2) those in which the disc is "radiated" by red all along the veins *and upon the adjacent surfaces of the wings*. All the eight females in the

type series of *batavus* fall into the first group; but of the eleven Wood Walton females, four only fall into group one, the remainder into group two. Curiously, the proportion of British females falling into the two groups, seventeen and thirty-four respectively, is almost exactly the same as in the Wood Walton *batavus*, and quite different from that found in the type series from Holland. If the data provided by the Wood Walton females be neglected, then *batavus* has normally a much darker hind-wing in the female than had *dispar*; if, on the other hand, the short type series does not truly represent *batavus* in its normal wild condition—as is quite possible—then no conclusions can be drawn from a comparison of the hind-wings. The width of the marginal band, at any rate upon the upperside, is quite unreliable as a differential character.

The red marginal band on the lower surface of the hind-wing has the appearance of being narrower in *batavus* than in *dispar*, on the average. Certainly, in some individuals of the former, it is wider than in narrow-banded specimens of *dispar*. To check this point, the width of the band has been measured in 28 ♂, 25 ♀ of *dispar* and 20 ♂, 18 ♀ of *batavus*, no specimen with a fore-wing length of less than 2 cm. being examined. The measurements were made along a line parallel to vein three and midway between it and the two black spots in area two, on either side of the band. The average widths thus obtained were: *dispar* ♂ 2.32 mm., ♀ 2.33 mm.; *batavus* ♂ 1.89 mm., ♀ 2.05 mm. Of the fifty-three *dispar* none had a band less than 2.1 mm. wide, a measurement that was only equalled by three and exceeded by five *batavus* among thirty-eight specimens. The greatest width in each case was, *dispar* 2.8 mm. (four specimens); *batavus* 2.5 mm. (two specimens). Fourteen *batavus* measured less than 2.0 mm. Measurements therefore confirm appearances. The British colony, in respect of this character, agrees closely with the type series of *batavus*, and shows no approach to extinct *dispar*.

Another character furnished by this band is worth mentioning. In *dispar* its inner edge is almost always level between the black spots of the submarginal series, and these, to a large extent, are “inset” within it. In *batavus*, on the other hand, there is a strong tendency for the band to be excavate between these spots, the spots themselves resting upon its inner edge as a rule, seldom at all or only slightly inset. This character is very well shown in plates 4 and 6 of the *Tijds. v. Entomologie*, LXV (1922), accompanying the article by J. Th. Oudemans upon these two races.

The development of the black maculation of the lower surfaces of both wings provides a fairly safe character. It is nearly always much stronger in *dispar* than in *batavus*, although individual examples occur in each race that can be readily matched with examples in the other. No attempt has been made to confirm this character by measurements, but there can be very little doubt that they would support it. The submarginal spots of the fore-wing in areas two and three, of which the counterparts on the upper surface were measured, would certainly confirm it. Oudemans' two plates, referred to above, afford convincing evidence in support of the contention.

There are two small differential characters in connection with the maculation that appears to be almost constant. In *dispar* the lowest spot of the sub-basal series on the lower surface of the hind-wing, that is to say the innermost spot in area 1c, is relatively large (as large as the costal basal spot), and is intensely black



like the other two spots of this series and the two basal spots. In *batavus* it is relatively smaller, less intensely black, and normally of the same size as the basal cell spot, that is to say, smaller than the basal costal spot. The basal cell spot also varies in a like manner. There is, then, a greater disparity in size between the basal cell spot *plus* the spot in 1c and the other three spots of the basal and sub-basal series in *batavus* than in *dispar*. The other character is furnished by the size of the black spot against the margin in area 6 at the apex of the hind-wing on the underside. The comparative size of this spot in the three races will be readily appreciated from an examination of the figures on Pl. II—very large in *dispar*, small in *batavus* and almost obsolete in *rutilus*.

The Committee has decided to deposit annually in the British Museum (Natural History) a short series of specimens selected from the year's brood of *C. dispar batavus*, so that, in the event of the British colony developing any marked variational tendency, either in the direction of the extinct *C. dispar dispar*, or otherwise, some evidence will be available that may help in tracing its development.

In England the larvae of *dispar* fed exclusively, so far as is known, on the great water-dock *Rumex hydrolapathum*, and although there is reason to suppose this to be the plant principally affected wherever the insect occurs, unquestionably it is not found in all *dispar*'s habitats. Mr. W. G. Sheldon in 1914 found the butterfly frequenting the small side dingles on the slopes of the lower Volga Valley near Sarepta (*Entomologist*, XLVII, p. 272, 1914), and during several weeks' close examination of the district did not come across a single example of this very conspicuous plant. In Hungary, too, the same observer has found the butterfly on hillsides miles away from the Danube marshes, where *R. hydrolapathum* grows.

Tutt gives the following list of food-plants, in addition to the one above named : *R. obtusifolius* (Sich); *R. sanguineus* (L.); *R. aquaticus* (Gillmer); *R. crispus* (Nicholson); *R. acetosa* (Wocke), and *Polygonum bistorta* (Heyne).

It has always been a matter of the keenest regret, not only to Lepidopterists, but to all Nature lovers, that we should have lost our peerless native race, for *dispar* is unquestionably the most beautiful of all European butterflies when seen in its natural surroundings, and, of all the races, the old British one was the finest. It is very beautiful as a cabinet specimen, but it must be seen in flight for its full beauty to be adequately appreciated. It is the combination of the blue grey underside, mingling with the rich red copper hue of the upperside, that constitutes its most exquisite charm. There are several other allied European species that are brilliantly coloured, but they do not compare with *dispar* for beauty, it stands in this respect in a class by itself.

#### Early attempt at re-introduction of the species in Great Britain.

The first attempt to re-introduce *dispar* into Britain was made by the late G. H. Verrall, who announced in the *Entomologist*, XLII, p. 183 (1909), that he had turned down in Wicken Fen a number of larvae. There is unfortunately no record of the steps taken to secure success. Except for a very few plants, *R. hydrolapathum* is absent from this fen, and in all probability has never occurred there at all commonly during the last half-century. In any case the attempt did not succeed, for in the same journal (XLV, p. 156, 1912) Mr. W. J. Kaye writes

that "not a single copper has been seen," "apparently owing to the wet and cold summers of 1909 and 1910," but the person employed to put out the larvae observed, "even if the coppers had hatched, there was not a great deal of the great water-dock, their food-plant."

### Successful establishment in Southern Ireland.

The first successful attempt to form a colony was made about the same date by Capt. E. B. Purefoy. The site for the attempt was a snipe bog and the surrounding terrain in the south of Ireland, kindly lent for the purpose by Mr. W. B. Purefoy of Greenfields, Tipperary.

A great deal of preliminary work was necessary in the way of clearing the ground, and introducing the food-plant, in readiness for the reception of the butterfly. Roots of *R. hydrolapathum* were sent from England, and in addition nurseries of seedlings were formed, large quantities of which were put out from time to time. Towards the end of May 1913 ten dozen larvae of *C. dispar rutilus* were received from Herr H. Rangnow of Berlin, and were put to feed upon *Rumex* plants in pots. Nearly all these larvae died, probably owing to the manner in which they had been packed for the journey, and ultimately only eight imagines were obtained, four of each sex. However, the four females did very well when released on the prepared ground, and deposited ova fully on those plants which had been suitably placed with regard to their immediate surroundings, thereby suggesting a considerable modification in the placing of further docks, that was an important factor in the ultimate success of the experiment.

In May 1914 Capt. Purefoy travelled to Berlin, and with Herr Rangnow and his son visited the marshes where *rutilus* occurred. These were all to the north of Berlin, and only a few miles away, the two of the greatest importance being Heningsdorf and Finkenkrug. Nearly seven hundred larvae were obtained, but a rather large proportion of these proved to be parasitised. In order to avoid any possibility of introducing a parasite into the site of the proposed colony all the pupae were kept under nets, and only the imagines, about four hundred in number, were released, and as, fortunately, there was a spell of good weather just then, the food-plants were quickly stocked with ova.

This colony has now been in existence for fourteen years, and it appears probable it will hold its own so long as the herbage in general, and the *Rumex* in particular, receives a very little attention once each summer. The bog water is acid and not much appreciated by the *Rumex*, but the latter hold out well in those parts that are wet all the year round. It was found during the course of this experiment that an ample quantity of flowers in the immediate vicinity of the colony for the butterflies to feed upon was essential to success, and here the flower supply was ample and very varied.

### Introduction into England.

One of the objects of this Committee is to try to re-introduce species of Lepidoptera, and specially Rhopalocera, that at one time inhabited Britain but owing to one cause or another are no longer found here, and as *dispar*, from its beauty, its interest and history, appeared to be a species that was pre-eminently worthy

of re-introduction, steps were taken to bring about this object. As a preliminary, Capt. Purefoy's assistance was solicited; all that the Committee hoped for was generously and freely given by him, and it is entirely owing to his skill, experience and energetic efforts, that success has been obtained.

The first attempt under Capt. Purefoy's auspices was made in 1926; in the early part of that year Mr. John Cator, of Woodbastwick Hall, in the Broads district of Norfolk, kindly placed certain of his marshes at the disposal of the Committee for the purpose of founding a colony. Capt. Purefoy and Mr. Edelsten visited the marshes in May 1926 and selected the ground considered most suitable for the experiment. Cages were set up, and it was arranged to send *rutilus* pupae from Capt. Purefoy's Irish colony to Mr. Cator's keeper, who placed them in the cages. During June about 550 pupae were sent to the keeper, who visited the cages daily, and released the imagines as they emerged. Unfortunately the weather at that date was extremely unfavourable for the experiment, cold and windy and with much rain. The emergence extended from early July until the middle of August, and almost the whole of the pupae produced imagines. In September Capt. Purefoy visited the colony and found a fair number of larvae. It was thus evident that quite a number of the butterflies had deposited ova. The keeper reported seeing some imagines in July 1927, and also found ova on the food-plants. Ova were again noticed in 1928, but no imagines were seen. As the food-plants in the Woodbastwick marshes only grew alongside the waterways, and there were no plants in the open marshes, which is the situation favoured by the butterfly, it was unlikely a successful colony could be established in them. The Committee desire to thank Mr. Cator for generously placing his marshes at their disposal, so far as was possible, and for giving the services of his keeper, Mr. Hunt, especially as the latter had much other work to do. Mr. Hunt carried out the work entrusted to him in a most able and intelligent manner.

The experience gained from the Norfolk experiment seemed to indicate clearly that any further experiments, to be successful, would have to be made on ground that could be devoted entirely to the formation and maintenance of a colony, a condition which appeared most likely to be provided by a suitable Nature Reserve. The Committee was therefore fortunate in receiving an offer of the Wood Walton Fen Reserve in Huntingdonshire from its custodians, The Society for the Promotion of Nature Reserves, which was gratefully and gladly accepted. Wood Walton Fen seemed in many ways an ideal spot for the new experiment. It is situated ten miles north of the town of Huntingdon, in the heart of the old *dispar* country, and within a few miles of Holme Fen, where the last specimens were taken. The food-plant, *Rumex hydrolapathum*, grew there abundantly, and the terrain was suitable for planting more. Correspondence with certain Dutch entomologists had established the fact that it might be possible to obtain a certain number of the fine race that had recently been discovered in Holland, and to which reference has already been made. It seemed particularly appropriate, too, that if this most "*dispar*-like" race were to be established in Britain, then Wood Walton Fen should be the site of the colony, because it was bequeathed to the nation by the late N. C. Rothschild, who was so very keenly interested in Nature Reserves. There is no doubt Mr. Rothschild had intended to form a colony of *dispar* at Wood Walton,



for in 1916 he had requested Capt. Purefoy to inspect the ground preparatory to starting a colony there from Capt. Purefoy's Irish stock. About this date an area of about twenty acres was cleared of the scrub and other unsuitable rank growth.

There was also an additional occasion of some urgency for endeavouring to form a colony of *C. dispar batavus* in Britain. Apparently never abundant and always extremely local in its native country, this newly discovered race was already hard pressed by collectors, and in the absence of protection in Holland there seemed a probability of its quickly meeting with the same fate that befell the old British race.

Wood Walton Fen has an area of several hundred acres. The land was once under cultivation, and was divided into fields of about twenty acres each, that were separated by deep water dykes. The fen is flanked on all sides by broad canals, there is only one approach to it, from the east side; the soil is peat, and large quantities of that material were cut and sold for fuel about half a century ago.

For many years the fen has suffered much from neglect, and, indeed, its overgrown condition is such that it can only be described as a jungle, useless alike to man, beast, bird, or insect, and to the vast majority of its native plants. The growth consists of stunted alder, birch, willow, and aspen, all linked together by brambles and other creeping plants, much of this tangle is dead, because when the roots of the shrubs penetrate a certain depth they reach an unfavourable strata and the plants die. As the sun cannot penetrate this mass of cover, the flora of the fen has disappeared, except in a few open patches, and to a certain extent along the dykes.

Such was the condition of the fen when Capt. Purefoy first visited it in the interests of the Committee, and it was obvious to him that much labour and expense would be involved before a portion could be made suitable for a colony of *dispar*. The site selected was the portion of ground cleared some years previously on the instructions of the late N. C. Rothschild. It consisted of one of the original fields and two water dykes, one to the north and the other to the south of the field, together with a strip of ground on the far side of each dyke; the total area therefore was about twenty-two acres. In this area, although the shrubs had not returned to any considerable extent, the other growth, especially of reeds (*Arundo phragmites*), had not been cut for several years, and the whole had become a jungle; the task of clearing it was a formidable one, and, but for the generosity of Lord Rothschild in paying the cost of the labour involved, the experiment would have had to be carried out on quite a small scale.

The selected area is the only portion of the fen that has received any care of recent years, and it now presents a very different appearance from the surrounding thicket. The growth consists of rushes (*Juncus*), reeds (*Arundo*), sedge (*Cladium* and *Carex*) and various marsh grasses, and from out of this natural cover the great water-dock pushes up its leaves all over the open ground. This point is of the utmost importance. *Rumex hydrolapathum* will always grow freely along the sides of streams, dykes, etc., but in these exposed positions it is avoided by the female *dispar*. On the other hand, it is extremely difficult to get it to grow on

the flat, and surrounded by natural cover of a height to suit the butterfly; it will apparently only do this when the soil is peat, and the terrain a very low-lying one, with the water never very far from the surface. Such ground must inevitably be subject to floods, in fact it always is, but it is on plants growing under such conditions that the female butterfly prefers to deposit her ova.

The first flower to show itself in the fen as summer approaches is the ragged robin (*Lychnis flos-cuculi*), which in the uncleared fen is only found in small patches, but on the cleared ground it covers almost the whole acreage, and is a beautiful sight. Other flowering plants that are common throughout the clearing include *Galium uliginosum*, *Thalictrum flavum*, *Lysimachia vulgaris*, *Valeriana officinalis*, and *Lythrum salicaria*; the last named though flowering rather late is much favoured by *dispar*, and always seems to be present in its habitats. Mention should also be made of *Vicia cracca*, which is found in large patches, and adds very much to the beauty of the clearing; *Eupatorium cannabinum* flowers too late for *dispar* to frequent its blossoms, which, however, attract large quantities of Vanessid butterflies in late August and throughout September.

Beds of *Iberis amara* (annual candytuft), a plant much affected by *dispar*, were sown in the spring of 1927, in order to supplement any possible shortage of flowers, and since then it has sown itself very freely in many of the barer places. Marsh ragwort (*Senecio palustris*), marsh thistle (*Carduus palustris*), watercress (*Nasturtium officinale*), and other flowers known to be suitable for the butterfly to feed upon, were also planted.

The fen was first inspected in 1926 by Capt. Purefoy on October 13th. A comparatively dry winter, and the absence of floods, allowed the work to be carried on without interruption until all was cleared, and then commenced the task of planting out innumerable clumps of the *Rumex*. There was a considerable amount of the plant already in the field, but a great deal had been smothered by the reed (*Phragmites*), which was almost impenetrable in places. *Rumex* grows in all the canals around, and the supply is unlimited. Mr. G. Mason, the fen watcher, who was carrying on the work, and who did it in a most able and intelligent manner, brought in many boat-loads of the roots without any difficulty. All this carried the work well on into the spring of 1927.

It should be mentioned here that the field will always require partially cutting once a year, the best time for this being the end of May. Having by this cutting checked the spring growth of the reed, the later growth can be left alone. Wood Walton Fen is only too subject to deep floods, and it is very desirable therefore, in the butterfly's interest, that the winter should be faced with the growth of herbage all over the area of a height of from three to four feet.

At the time the Committee first considered it desirable that a colony of *C. dispar batavus* should be established in Britain, it was not realised how extremely difficult it would be to obtain a number of larvae that would be adequate for the experiment. *C. dispar batavus* was first observed in a marsh in the province of Friesland in Holland. About the year 1915, however, this marsh was reclaimed, and the food-plant disappeared. Meanwhile the butterfly had been found in a second marsh situated some ten miles from the first one, but its occurrence there soon leaked out, and it became hard pressed by collectors.

The Committee has to thank in the first place Col. F. E. Labouchere, who put them in touch with Mr. A. J. Labouchere of Utrecht, who very kindly interested himself in the attempt to form a colony in England. Mr. Labouchere introduced the project to Mr. J. H. E. Wittpen of Amsterdam, who had visited the Friesland marshes on many occasions, and who probably knew as much, or more, than any other Dutch entomologist, about *C. dispar batavus*.

Mr. Wittpen had been successful in getting females to deposit ova in captivity, from which he had bred a very fine series of imagines. He promised to do his best for the Committee, at the same time expressing doubts as to the probable success of his efforts, owing to the scarcity of the butterfly. He visited the Friesland Marsh in May 1926, but owing to the floods and impossible weather, he was forced to return empty-handed. However, he wrote to the Committee that he would endeavour to secure some females in July; unfortunately when that month arrived the weather was so inclement that only two females could be captured. From these Capt. Purefoy received a very small number of ova, the resultant larvae from which were kept in confinement on *Rumex hydrolapathum* plants growing in pots.

Although the success of a further visit to Friesland in May 1927 seemed problematical, it was obviously the only possible step to take if anything like an adequate supply of the butterfly was to be obtained. Capt. Purefoy accordingly went over to Holland with Mr. Schofield, and was met at Utrecht by Mr. Labouchere and Mr. Wittpen, who accompanied them to the *dispar* marsh, having made all necessary arrangements in advance. This visit did not prove unfruitful, for it added five females to the slender stock that emerged from pupae in 1927. The few larvae brought back from Holland were found at wide intervals. The total number of butterflies bred in July 1927 was thirty-eight, of which thirteen were females. The male *C. dispar batavus* always seems much more abundant than the female.

The period of emergence being rather an extended one, and the stock so small, it seemed highly important to arrange matters so that as large a proportion as possible should emerge simultaneously. It was therefore necessary to retard the early male pupae very considerably, a task which the cold, cheerless summer made less risky than it might otherwise have been; the hastening up of the late pupae was, of course, far more simple. The task was accomplished with perfect success, and the whole of the brood was available for the fen between July 20th and the end of the month.

With so small a number of butterflies it was thought advisable, if possible, to catch some of the females after impregnation, so as to secure a large number of ova, but this was no easy task in a rough fen. However, Mr. James Schofield, who was in charge of Capt. Purefoy's Irish colony, and who had formed one of the collecting party in Holland, came over again from Ireland and joined hands with Mr. Mason in the fen. The work he accomplished during the last days of July was indeed remarkable, for the weather generally was unfavourable just then, with a strong wind blowing all the time. Mr. Schofield liberated the butterflies as they arrived by post. The reeds had grown again waist high, and the whole field was a tossing sea of green as he searched for the females. Walking through these wastes whenever the sun shone, he actually discovered four pairs *in coitû*,



and secured all of them. Later four more females were netted whilst actually ovipositing, a fact that proved their fertility.

These females were confined for a few days over plants of *R. hydrolapathum* growing in pots, and in the meantime between three and four hundred ova were collected from plants growing in the fen, where they had been deposited by the other five females that had been released. After a confinement of four or five days the captured females were again released, and being but little wasted were well able to resume their normal life in the open.

The weather in August was, if possible, worse than it had been in July, and the butterflies, by doing as well as they did, proved that they are indeed a hardy race. An ample stock of ova had now been secured for home breeding, and there was a fair number also in the fen, but some anxiety was felt lest possibly their stock might be somewhat inbred. This fear, however, was removed by Mr. Wittpen, who once more journeyed forth in the service of the Committee, and this time searched some new terrain that he thought might produce *C. dispar batavus*. His hopes were realised for "somewhere in Friesland" he captured six females, and from these he secured, and sent to Capt. Purefoy, a large supply of ova. These were treated with the care they deserved, and several hundred of the resulting larvae reached the hibernating stage.

The fen was visited by Capt. Purefoy on September 13th, and quite a satisfactory number of *R. hydrolapathum* plants showed signs of larvae feeding upon them, a good many small ones being actually seen, all just about to retire for the winter.

As soon as the local harvest was over, a large amount of work was carried out in the fen, both in clearing undesirable growth and in planting the food-plant, and this continued until about November 20th, when the first flood of the season put a temporary stop to these operations. This was a normal flood of from eight to ten days' duration, and was not deep enough to submerge everything. A further visit was made by Capt. Purefoy after the water had retired several days, the whole aspect of the field was then extremely promising: the flood had not done any harm to the planting, and had probably not lasted long enough to damage any considerable proportion of the larvae. The docks looked well and had plenty of the brown leaves, in which the larvae usually hibernate, sticking up above the flood level. If this was, as the local inhabitants stated, a normal flood, then there did not seem much to fear from this cause; but the winter turned out to be far from normal, and one that was to break all records. By December the 22nd the flood covered the fen again, and the whole district was under deep water before the memorable blizzard of Christmas night arrived to block the countryside with snow; when the thaw that followed set in, all the low-lying country in that part of England was turned into a vast lake, and remained so for many weeks. The water in Wood Walton Fen reached a depth of over four feet, and many storms swept it, raising great waves, which swept away many dead docks, leaves and stems and all loose material.

January 6th, 1928, was the date of the worst storm. On that occasion more than forty of the large poplars that form a screen along the east flank of the fen were snapped off by the wind, and the waves striking the embankment on the far

side of the canal threw up spray to a height of over eight feet. It seemed quite certain that any larvae that had crawled up stems in search of safety must have been annihilated by this terrific weather. Had a certain number of them been able to sleep out the flood and the storm, like "the oyster in his bed," deep down at the base of the food-plant, in situations unaffected by the storm? That was a question that could not be solved for many weeks.

*The flood lasted from December 22nd, 1927, until about February 20th, 1928, a period of sixty days.*

Capt. Purefoy paid his next visit to the fen on March 6th, the dead dock leaves and the surrounding cover were found to be mostly intact, much of the planting was of course damaged, and an unsavoury slime had been spread over most of the prepared terrain by the retiring waters. The next and most important visit was made on April 13th, by which date it was judged that the larvae, should any have survived, would have just commenced to make their characteristic little "windows" in the young dock leaves.

It was a strenuous search, the plants themselves being mostly hidden under rubbish or slime, but it was not an unfruitful one, several very small larvae, still clothed in their brown winter coats, coming to light. The highly interesting and important fact was established on this occasion, that a certain number of the larvae could sleep out long periods with as much as three or four feet of water over them.

In order to test the manner in which the larvae spent the winter, and their power to resist floods, Capt. Purefoy carried out an experiment in the autumn of 1927, an account of which is to be found in the *Proceedings*, II, Part III, pp. 84-86 (7.12.1927). This experiment tended to show that the larvae were forced to crawl up above the water line after ten days' submergence, or even less. If this had been true there would not have been any larvae alive in the fen after a flood of sixty days and the great storms that supervened. Some, however, were found alive, and, in order to explain the apparent mystery, Capt. Purefoy carried out a second experiment in the autumn of 1928, using, on this occasion, actual fen soil, fen rubbish, and fen moss. The results of this trial were entirely different from those previously obtained, and led him to conclude that peaty water standing on vegetable debris and moss can keep the larvae alive for an indefinitely longer period than flood water standing on ordinary soil, and that the peaty soil is necessary not only for the food-plant, but also for the hibernation of the larvae.

The following is Capt. Purefoy's account of his experiment carried out last autumn :—

The result of the experiment, carried out in the autumn of 1927, tended to show that the hibernating larvae of *C. dispar* could not withstand flooding for more than eight to ten days. At the conclusion of this period, or sooner, they woke up and started to climb up out of the water, if they could. The experiment was carried out with a dock plant growing out of ordinary garden soil. In the search made in April 1928 along the banks of the dykes, which is the highest and also the soundest ground, no larvae turned up at all. These docks had been under water for a shorter period than those on the flats. On the plants growing on the flats, however, and even at the bottom of the lowest furrows, larvae turned up in

small but sufficiently satisfactory numbers. These plants grow out of black peat, decaying reeds and sticks and moss. Those on the banks out of sound ground without the layer of dead reeds or the moss.

A large box of black peat and a second box full of dead reeds, sticks and moss, were taken from the fen on August 1st, 1928. The contents of these boxes were treated for pests for a week on their arrival in Kent. Three large pots (14 in. diameter) were built up : ordinary soil at the bottom, 3 in. of peat next, and about the same of reeds, etc., above. The moss was spread over this, and a few seedling water-dock were planted in each pot. Finally a few grass and clover seeds were scattered amongst the moss so that the roots of the resulting plants might bind the whole together and prevent anything floating up when flooding occurred later. The result was satisfactory, each pot growing into a nice "bit of fen" as the weeks went on. From time to time larvae were introduced into each pot, a careful count being kept. The idea was that the larvae when retiring for the winter would seek refuge in a hollow reed or rotten stick, where some air might be retained, and thus escape even a prolonged flood. In order to encourage the larvae to seek for such a retreat, all withering or brown leaves were removed from the plants directly they appeared. In spite of this promptitude these leaves often already contained a sleeper, showing that the brown leaves were distinctly their first choice. These hibernators were always removed to a "dry" pot, an equal number of fresh feeders replacing them. On several occasions larvae were found trying to settle down on the net, and it certainly looked as if a large proportion of them were dissatisfied with the reed strata as winter quarters. By September 15th very nearly all the larvae had ceased feeding, and from that date onwards no more brown leaves were removed. The pots were left alone until the last week of October, when it was decided to examine "A" pot before the flooding, in order to find one or two larvae actually in hibernation inside reeds or at all events amongst them. The first day's examination among the moss produced one dead larva and one still wandering about. The second day a portion of the reed bed was taken up and every reed or hollow stick split open; no trace of a larva could be found, neither were there any silk pads where they had been. On the third day all brown leaves, even the tiniest ones, were removed for examination, and were found full of hibernators. These larvae must have actually waited amongst the moss until, quite late in September, brown leaves became available and then crawled up into them.

On November 1st all three pots were flooded. This was done gradually, and the flood rose up from the bottom through the peat, etc., just as it does in the fen.

"A" pot was left under deep water for sixteen days, but nothing appeared. This was not surprising, for all brown leaves had been moved to a "dry" pot. It has been placed aside until the spring without further examination, and it will be extremely interesting to see if anything turns up on it. It is more than likely that it will.

"B" pot. As the flood welled up through the peat and the herbage, it turned over a clover leaf on which was a hibernator whose silk pad could easily be seen; it was this silk that kept the frail leaf together. As the water rose this larva could always be seen, and it never moved. On the second day of flood, one larva appeared on a tiny grass tip that was just above the water. By the third day it



had crawled down below the water, and there it remained quite visible for four days, when it disappeared. It must have crawled further down, as it had certainly not crawled up. Thirteen days elapsed without anything further happening. Then three more larvae became visible on grasses far below the water line. They were always on the extreme upper tip of the grass blade, and would undoubtedly have crawled up out of the water had their grass stems permitted them to do so. However, they were making the best of the situation, and seemed none the worse. No larvae became waterlogged and swollen as in last year's experiment. On several occasions the water was agitated in order to see whether these submerged larvae would lose their hold and float upwards. In no case did this happen. They clung tightly to the stems evidently feeling that their safety depended on their hold. This was the situation at the end of fifteen days' flood. The larva on the clover leaf had never moved. The water was drawn off slowly, and this leaf was secured to put in a box to dry somewhat. The other moving larvae were watched for a time. They wandered about for a day or two before disappearing. They were none the worse. After a few hours the clover leaf and its larva were taken into a warm room and placed under a low-power microscope. In about ten minutes' time a slight movement was observed, and then the little tortoise-like head was thrust out and the larva looked around in alarm. It was evidently waking up from a complete trance; vitality was restored to it very gradually from the head downwards, nearly three-quarters of an hour elapsing before it could move its posterior segment. Finally, this larva walked about as if nothing had happened to it. After about two days some of the leaves in the pot were carefully raised, and various hibernators which had never moved at all during the fifteen days' flood were seen, five being counted underneath one small brown leaf.

"C" pot. Thirteen days' flood passed by without anything whatever being visible in this pot. On the fourteenth morning five larvae could be seen on grass stems far below the water. No further change occurred, and when the period of fifteen days was complete the flood was drawn off. When the pot was fairly dry two or three of the best brown leaves were examined. There were hibernators in each. In the best leaf seven were counted. These had never moved. The best leaves are those which are held down flat by the growing grasses pushing up through the holes which the larvae have made in feeding. This anchors the dead leaves, and the hibernators are on the underside.

The result of this experiment may be considered entirely satisfactory. The average *bad fen* flood does not last longer than ten to twelve days, and this should not inconvenience the great bulk of the larvae at all. It is only reasonable to conclude that whereas water over ordinary soil or clay cannot meet the requirements of the larvae for more than a very short time, peaty water filtering through decaying reeds, etc., and growing moss, can do so for a very considerable period. It will be very interesting to note how many larvae start feeding in these pots in the spring. They are actually "bits of the fen."

This experiment on the ability of the larvae of *Chrysophanus dispar batavus* to withstand flooding in confinement, with the experience of the larvae in Wood Walton Fen in the winter of 1927-8, strikingly confirms and elucidates an old report respecting British *C. dispar* made by Haworth in a letter to the Rev. W. T.

Bree, who communicated it to the *Annals Mag. Nat. Hist.*, VII, p. 522 (1834). In this report Haworth remarks, "Some entomologists once made an excursion into the fens for the purpose of taking the beautiful *Lycaena dispar*, or large copper butterfly, which it is well known frequents low marshy grounds. The coppers were captured in good abundance. It so happened the following winter proved to be a very wet one, and the entire tract of land where the coppers had been found was completely inundated, and actually lay under water for a considerable time. The entomologists deemed that the flood would certainly destroy the coppers, and that the race would become extinct in that part of the country; the next summer, however, the butterflies were found in the very same spot, as plentifully as before; subsequently the tract of land was submitted to the action of fire, and the whole surface burnt with a view to agricultural improvement. After this operation the coppers were no longer met with in that particular locality."

The search in the Fen was renewed on various dates in April and May, each search increasing the bag, until, considering all the circumstances of the case, the quite satisfactory total of seventy-three larvae was reached. It now seemed certain that when the fen was properly stocked, a colony of *C. dispar batavus* could maintain itself, however bad a winter flood might occur. The disappointing weather of May and June 1928 was followed by some weeks of beautiful summery weather, very suitable for the all-important operation of adequately stocking the ground. Between thirty and forty larvae had been put under glass early in April so as to ensure a long season of emergence, and these were ready by the end of June. The first butterfly seen was gleaming across the fen on the 29th of that month. By the middle of July several hundred males were on the wing and the females were beginning to hatch out in increasing numbers, altogether upwards of one thousand imagines were released; pairings were frequently observed, the males nearly always found the females before the latter had taken their first flight; ova began to appear on the food-plants throughout the planted area, and it was noticeable that as usual the small or medium-sized plants were preferred to the large ones that had thrown up three or four tall flower spikes. The laying of eggs continued until late in August, the last female being observed on the 24th of that month.

An inspection of the *Rumex* plants on September 15th led Capt. Purefoy to the conclusion that the terrain was as thoroughly stocked as could be wished, and that the future success of this experimental colony seemed assured. It should, however, be mentioned that a certain number of pupae found under *Rumex* leaves had been parasitised. These pupae when discovered were placed in confinement, and in due course produced hymenopterous parasites, which have been identified as *Pimpla brassicae* and *Anisobas hostilis*. Some pupae again were killed by enemies at present not identified; there will therefore be factors other than the winter floods that will tend to restrict the number of *C. dispar batavus* in its new home.

In *British Ichneumons*, vol. 5, p. 145, Morley gives a doubtful record of *Omorga mutabilis*, Holmgr., being bred from *C. dispar* (*E.M.M.*, 1903, p. 148), and on p. 210 mentions that in the British Museum there is a female of *Anilasta ebenina*, Grav., together with the indurated larval skin of *dispar*, from which Stephens had bred it in the Cambridgeshire Fen many years ago.



The announcement is made in the *Tijdschrift v. Entomologie*, LXXI, p. lxxxii, published December 15th, 1928, that, encouraged by the success of the British experiment, the Dutch Entomological Society had decided to endeavour to found colonies of *C. dispar batavus* on suitable ground in Holland, where the butterfly would be protected from extermination. It is too early yet to know with what success the experiment will be attended, but in 1928 Mr. Wittpen put down about 350 larvae on plants of *Rumex hydrolapathum* growing in the selected spot.

In conclusion, the Committee wish to call attention to the fact that, although the introduction of *C. dispar batavus* has met with success at the start, if this butterfly is to be permanently established, it will have to be looked after, and a certain amount of cutting and replanting will need to be done every year. This work, unfortunately, cannot be done without funds, and the Committee therefore needs, and would welcome, the annual support of all interested entomologists.

#### *Papers.*

The following papers were read :—

1. "Notes on *Ampagia* (CURCULIONIDAE), with descriptions of new species," by Mr. A. M. LEA.
  2. "Hymenoptera of the 'St. George' Expedition collected in Central America and the West Indies," by Miss L. E. CHEESMAN.
  3. "Odonata of Matto Grosso, Brazil," by Miss C. LONGFIELD.
  4. "A Revision of the Indo-Australian and Ethiopian species of the genus *Microgaster* (Hym. Bracon.)," by Captain D. S. WILKINSON.
  5. "Pacific Pyrales of the 'St. George' Expedition," by Mr. E. MEYRICK.
  6. "On a group of minute Australian Thysanoptera (Tubulifera), and their association with the so-called Leaf-glands on *Acacia*," by Mr. R. S. BAGNALL.
  7. "Spiral and other anomalies of segmentation," by Dr. E. A. COCKAYNE.
  8. "Morphogenesis in the Muscoid Diptera," by Dr. W. R. THOMPSON.
  9. "Some CERATOPOGONINAE from the Transvaal," by Mr. B. DE MEILLON.
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# THE ENTOMOLOGICAL SOCIETY OF LONDON

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Authors proposing to illustrate their papers should communicate with the Secretary before the drawings are executed. The size of the finished work on plates should be limited to  $7\frac{1}{2}$  ins. by  $4\frac{3}{4}$  ins., after allowing for reduction, if any.

Attention is called to the Instructions to Authors issued with Part I of each volume, which may also be obtained at the Office of the Society. Inattention to these regulations may involve an author in considerable expense.

## WANTED.

The Society is willing to purchase volumes or parts of the Transactions for the years 1907, 1908, and 1912.

# MEETINGS

## TO BE HELD IN THE SOCIETY'S ROOMS

41, QUEEN'S GATE, S.W. 7

### 1929.

Wednesday, October	...	...	...	...	...	2
" "	...	...	...	...	...	16
" November...	...	...	...	...	...	6
" "	...	...	...	...	...	20
" December	...	...	...	...	...	4

### 1930.

" January (Annual Meeting)	...	...	...	...	15
" February	...	...	...	...	5

*The Chair will be taken at Eight o'clock.*

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